

ZEXEL - TEST VALUES
Injections pumps

BOSCH No.	:	9 400 610 115	1/4
ZEXEL No.	:	101402-2033	
Date	:	25.06.1990	[4]
Company	:	HINO	
Engine	:	W04C-T / 22020 2732A	

IP-Type number	:	101040-9300 / PES4A
Governor type number	:	105400-5721 / EP/RSV

TEST PREREQUISITES

Test oil	:	ISO-4113
Test oil inlet temperature °C	:	40.00...45.00
Inlet pressure	bar :	1.6
Test nozzle holder combination	:	1 688 901 013
Opening pressure	bar :	175
Test pressure line		
Inner x Outer Dia - Length	mm :	2.00 x 6.00 x 600

PORT CLOSING

Prestroke	mm :	3.2 ± 0.03
Rod position	mm :	-
Port closing mark	Cyl. No. :	-
Cam sequence	:	1 - 3 - 4 - 2

Port closing mark	Cyl. No. :	-
Port closing difference	°NW :	0-90-180-270

Tolerance	+ - °C:	0.50 (0.75)
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Injection Quantity :

Adjusting Point	Rod Pos. (mm)	Speed (rpm)	Injection Q'ty (cc/1000 str.)	Difference (%)	Fixed	Remarks
A	10.6	1500	94.0 - 98.0	± 3	Rack	Basic
H	approx. 7.1	400	10.6 - 13.6	± 15	Rack	Basic
A	10.6	1500	94.0 - 98.0	-	Lever	Basic

Timing Advance Specification :

Speed (rpm)							
Advance Angle (deg)							

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Injection pumps



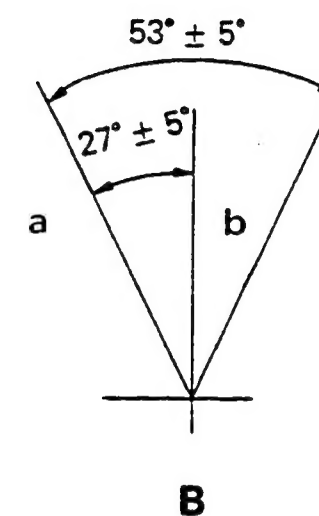
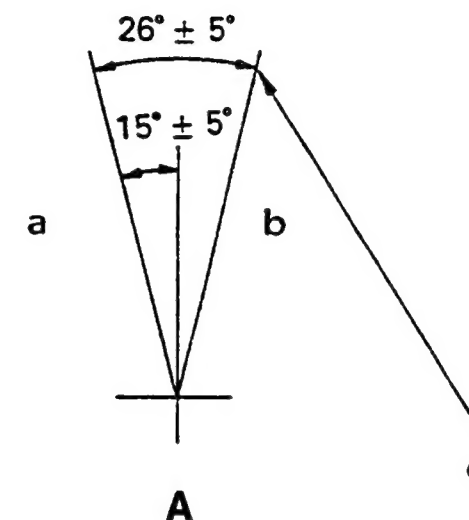
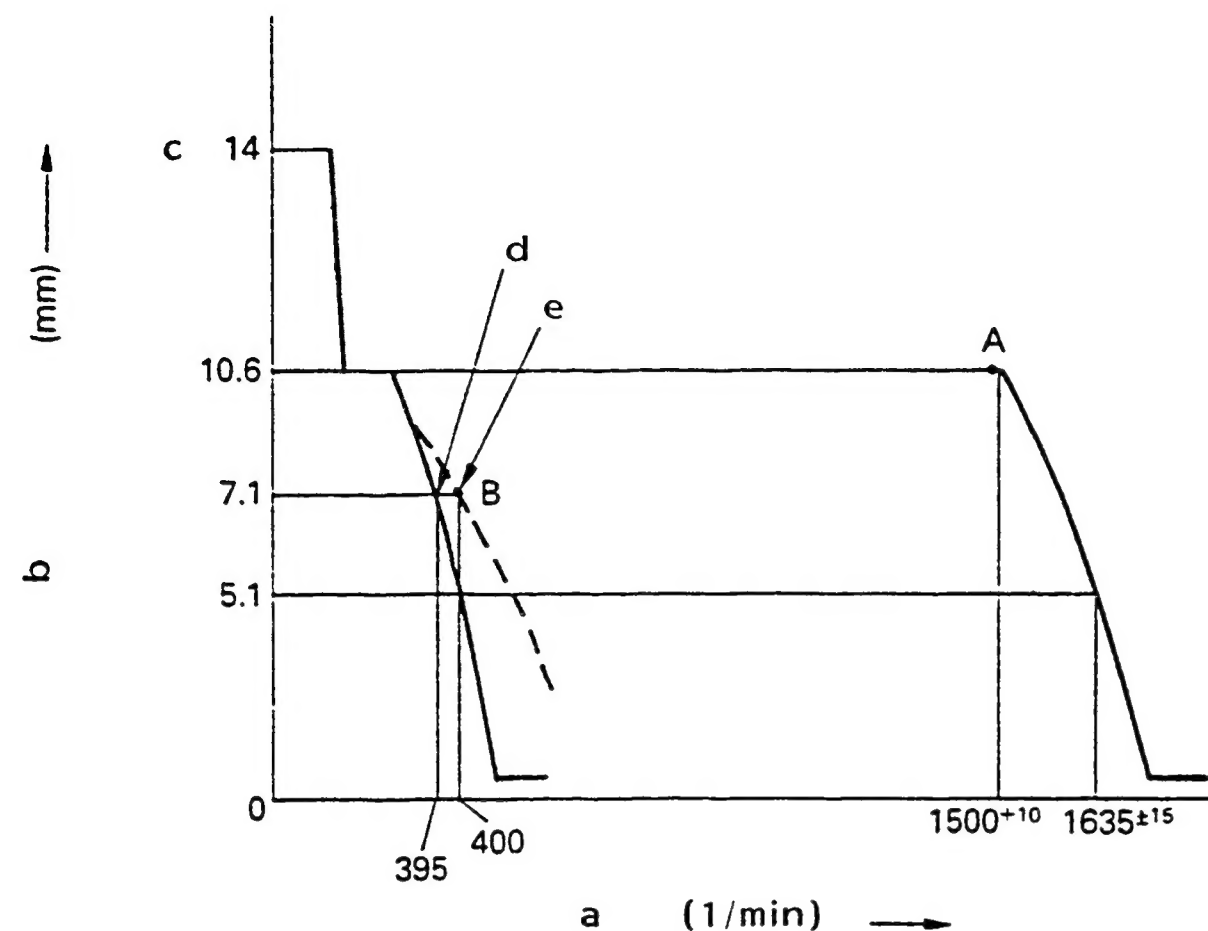


Fig. 1

GOVERNOR ADJUSTMENT

Recommended speed droop adjustment screw position: (12)
(Notches from fully tightened position)

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a = Pump speed
b = Control rack position
c = above
d = Main spring set
e = Idle-sub spring set

A = Speed control lever angle
a = Full-speed
b = Idling
c = Stopper bolt set

B = Stop lever angle
a = Normal
b = Stop

Note

- Before adjustment, remove the idling sub spring.
- Move the control lever fully in the stop direction, and set the minimum-speed stopper bolt so that the control rack position is 0.5 - 1.0 mm.

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Injection pumps



	Pump Speed (rpm)	Rack Position (mm)	Remarks
Full-speed Adjustment (Temporary)	1500 + 10	10.6	• Adjust using screw (1)
Full-load Adjustment	1500	10.6	• Adjust using screw (5)
Maximum-speed Adjustment	1500 + 10	10.6	• Adjust using screw (1)
	1635 ± 15	5.1	• Adjust speed droop using screw (2)
Idling Adjustment	395	7.1	• Fix control lever
	400	7.1	• Adjust using idling-sub spring capsule (4)
	-	-	• Confirm
Control Lever Angle Measurement	<ul style="list-style-type: none"> • Measure the control lever angle at the "idling" and "full" positions. • When the control lever is depressed toward the "full" position, replace the shifter's shim with a thicker one. • When the control lever is depressed toward the "idling" position, replace the shifter's shim with a thinner one. 		

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Injection pumps



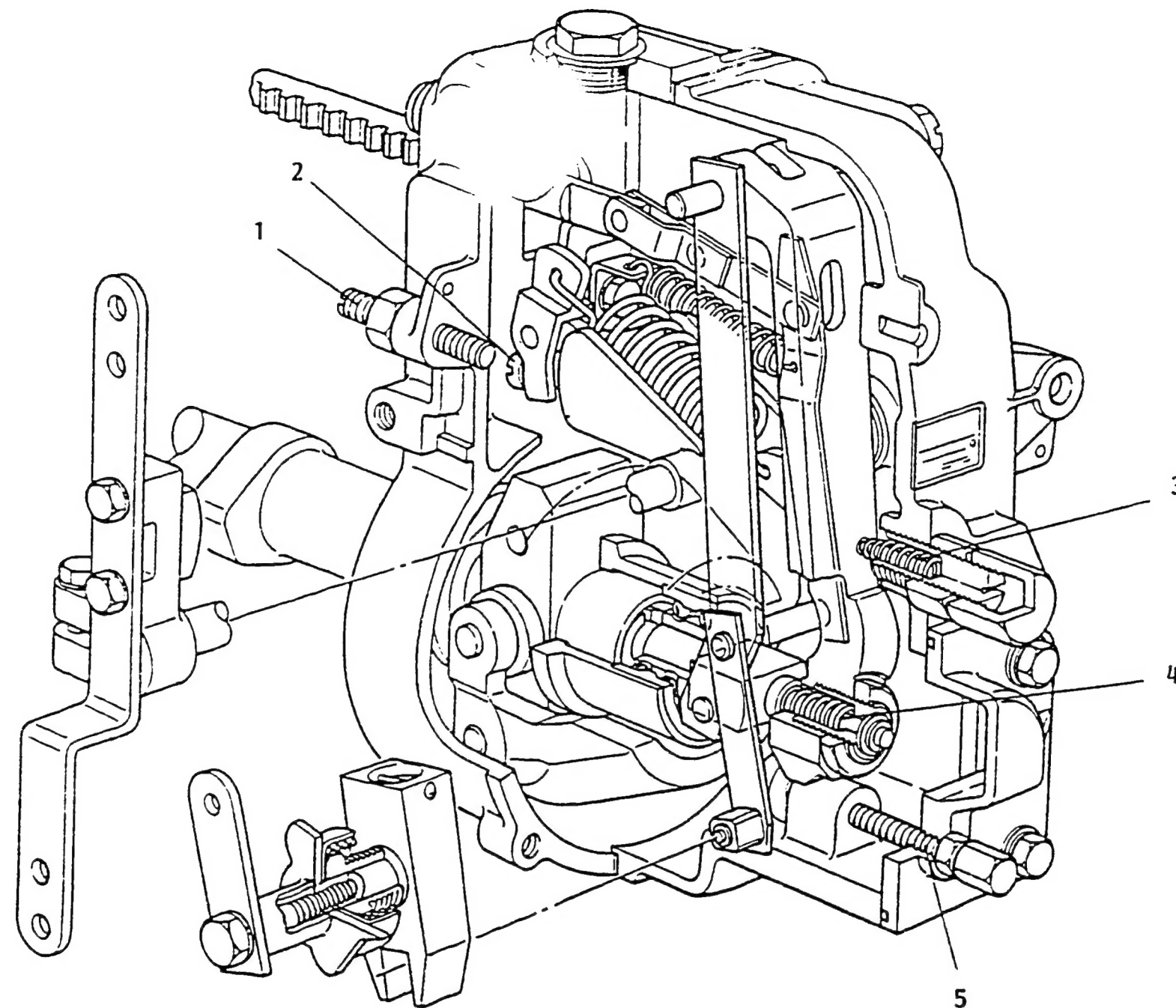


Fig. 2

- 1 = Screw
- 2 = Screw
- 3 = Spring capsule
- 4 = Spring capsule
- 5 = Screw

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Injection pumps

BOSCH No.	:	9 400 610 104	1/4
ZEXEL No.	:	101491-3160	
Date	:	25.06.1990	[1]
Company	:	KOMATSU	
Engine	:	4D105 / 6130711305	

IP-Type number	:	101049-8070 / PES4A
Governor type number	:	105402-1260 / EP/RSV

TEST PREREQUISITES

Test oil	:	ISO-4113
Test oil inlet temperature °C	:	40.00...45.00
Inlet pressure	bar :	1.6
Test nozzle holder combination	:	1 688 901 013
Opening pressure	bar :	175
Test pressure line		
Inner x Outer Dia - Length	mm :	2.00 x 6.00 x 600

PORT CLOSING

Prestroke	mm :	3.0 ± 0.05
Rod position	mm :	-
Port closing mark	Cyl. No. :	-
Cam sequence	:	1 - 2 - 4 - 3

Port closing mark	Cyl. No. :	-
Port closing difference	°NW :	0-90-180-270

Tolerance	+ - °C:	0.50 (0.75)
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Continued (Test values)

Injection Quantity :

Adjusting Point	Rod Pos. (mm)	Speed (rpm)	Injection Q'ty (cc/1000 str.)	Difference (%)	Fixed	Remarks
A	10.8	675	62.7 - 65.3	± 2	Lever	Basic
B	(9.2)	975	53.0 - 56.4	± 3	Lever	
C	9.0	1000	50.7 - 53.9	± 3	Lever	
D	approx. 8.5	350	13.7 - 17.3	± 10	Rack	

Timing Advance Specification : EP/SBZ
105629-0080

Speed (rpm)	450-650	675	800	1000			
Advance Angle (deg)	START	0.5-1.5	1.4-2.9	Finish 3.5-4.5			

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A12

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Injection pumps



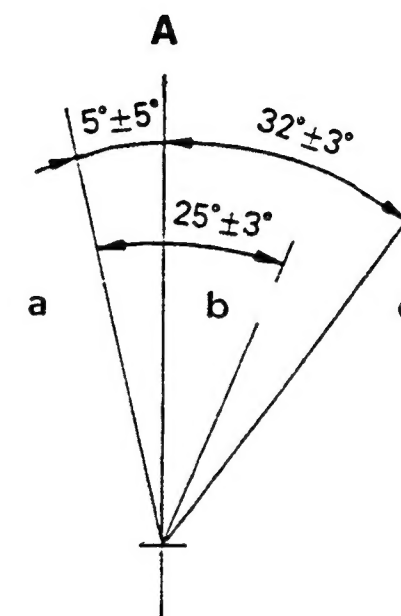
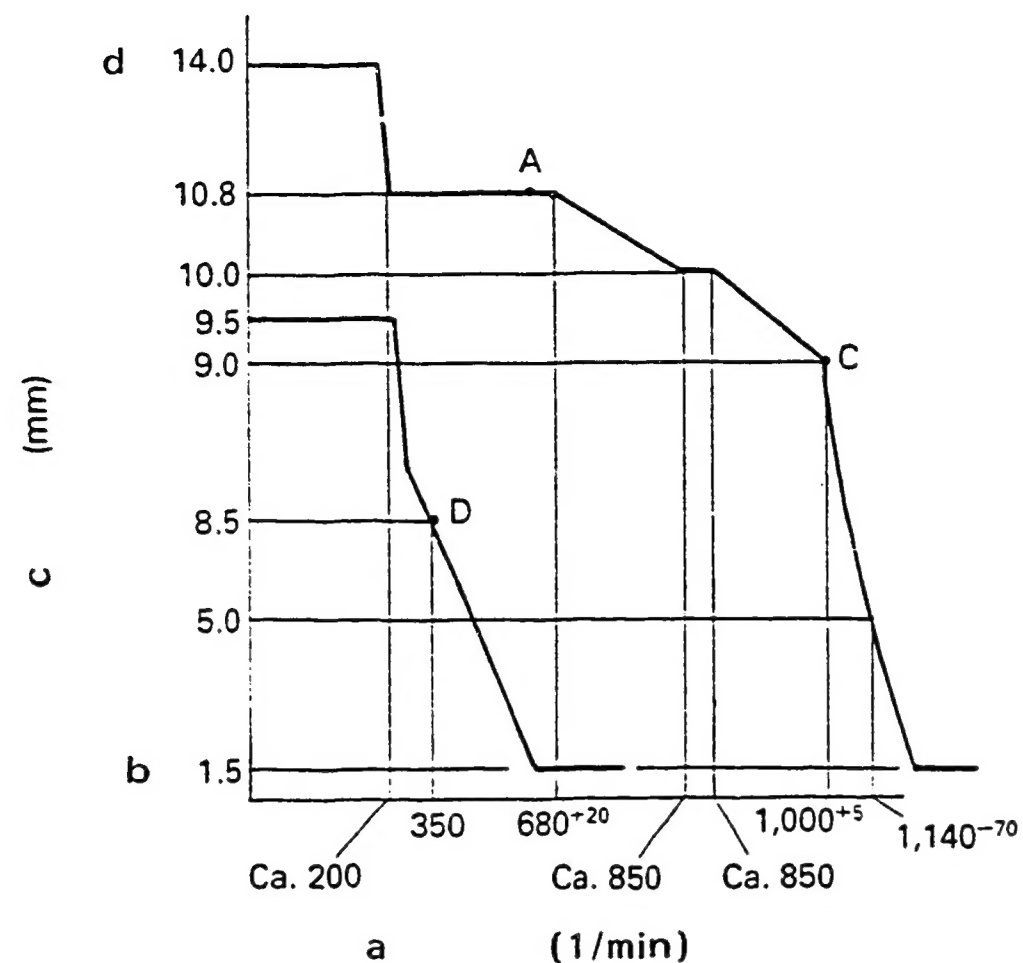


Fig. 3 GOVERNOR ADJUSTMENT

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a = Pump speed
b = below
c = Control rack position
d = above

A = Stop lever angle
a = Full-speed
b = Idling
c = Stop

- Before adjustment, remove the idling sub spring.
- Move the control lever fully in the stop direction, and set the minimum-speed stopper bolt so that the control rack position is 0.5 - 1.0 mm.

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Injection pumps



	Pump speed (rpm)	Rack position (mm)	Remarks
Full-load Adjustment (Temporary)	995 - 1005 1000	10.0 10.0	<ul style="list-style-type: none"> • Adjust using screw (1) • Adjust using screw (4)
Torque Control spring Adjustment	675 680 - 700 approx. 850	10.8 10.8 10.0	<ul style="list-style-type: none"> • Adjust using spring cap.(2) • Confirm • Confirm • Confirm the torque stroke is 0.8 mm
Idling Adjustment	0 350 - -	9.5 8.5 approx. 6.2 -	<ul style="list-style-type: none"> • Fix the control lever • Adjust using spring cap.(3) • Confirm
Maximum-speed Adjustment	995 - 1005 1070 - 1140 approx. 1200	9.0 5.0 below 1.5	<ul style="list-style-type: none"> • Adjust using screw (1) • Confirm speed droop • Confirm • Confirm
Torque Spring Adjustment	975 approx. 850 995 - 1005	(9.2) 10.0 9.0	<ul style="list-style-type: none"> • Adjust using spring capsule (5) • Confirm • Confirm
Full-load Adjustment (Install the cover on governor cover)	675	10.8	<ul style="list-style-type: none"> • Adjust using screw (4)
Control Lever Angle Measurement	<ul style="list-style-type: none"> • Measure the control lever angle at the "idling" and "full" positions. • When the control lever is depressed toward the "full" position, replace the shifter's shim with a thicker one. • When the control lever is depressed toward the "idling" position, replace the shifter's shim with a thinner one. 		



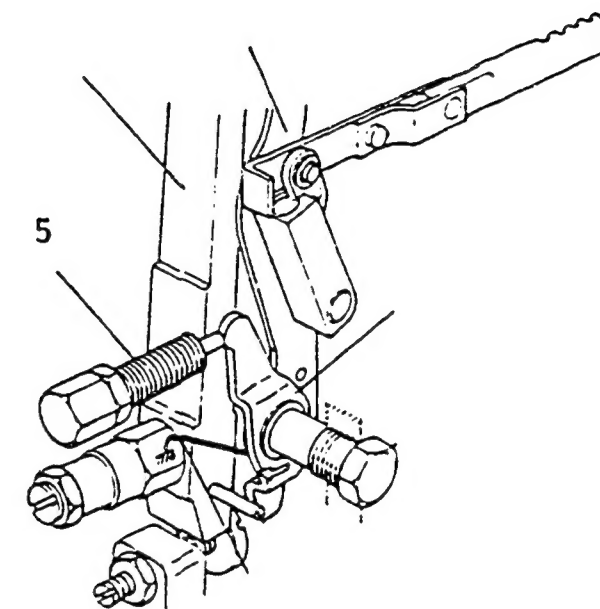
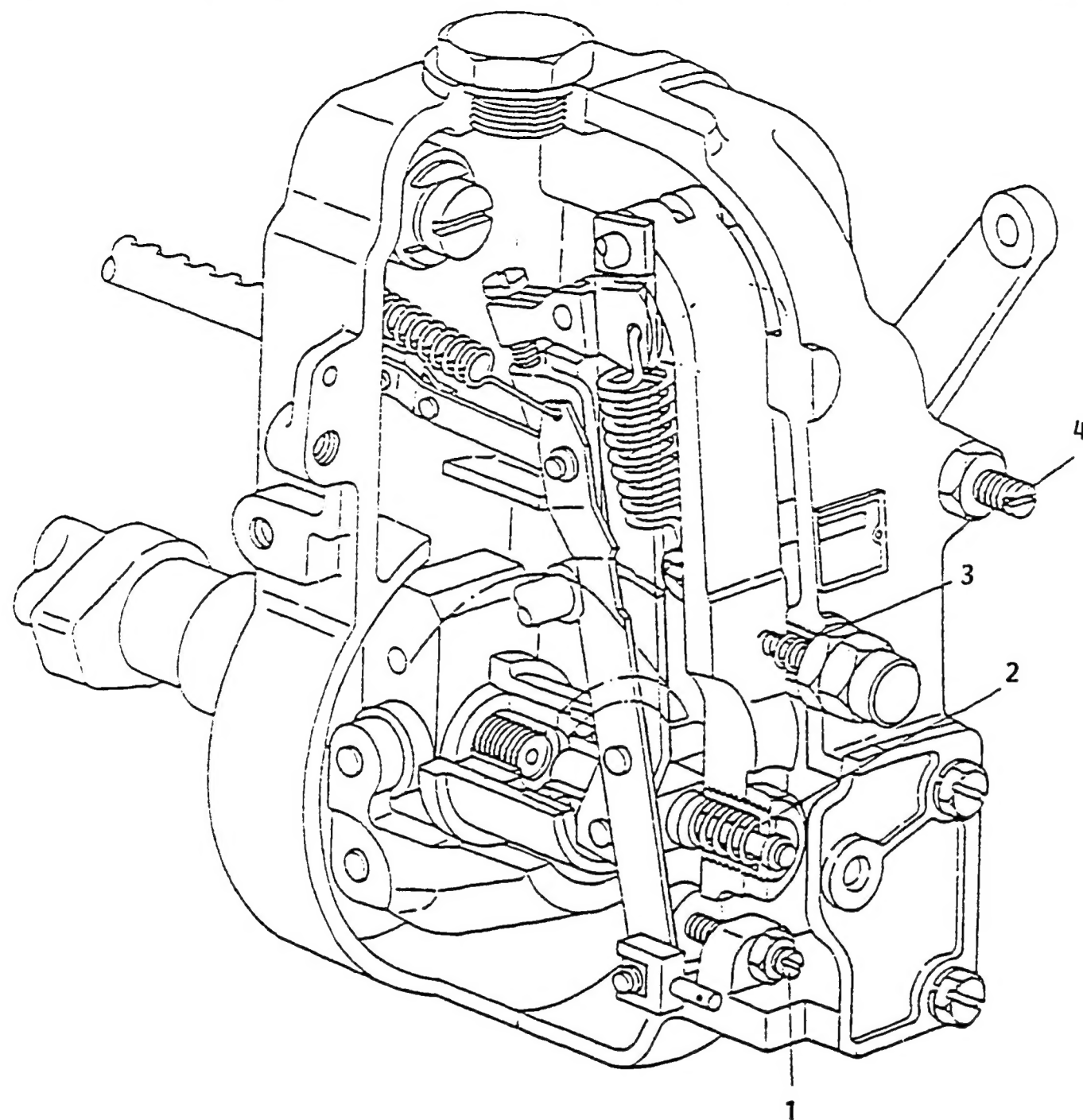


Fig. 4

- 1 = Screw
- 2 = Spring capsule
- 3 = Spring capsule
- 4 = Screw
- 5 = Torque spring capsule

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BOSCH No.	:	9 400 610 105	1/4
ZEXEL No.	:	101492-0331	
Date	:	25.06.1990	[1]
Company	:	ISUZU	
Engine	:	4JA1 / 894430-2532	

IP-Type number	:	101049-9620 / PES4A
Governor type number	:	105400-4210 / EP/RSV

TEST PREREQUISITES

Test oil	:	ISO-4113
Test oil inlet temperature °C	:	40.00...45.00
Inlet pressure bar	:	-
Test nozzle holder combination	:	1 688 901 013
Opening pressure bar	:	175
Test pressure line		
Inner x Outer Dia - Length mm	:	2.00 x 6.00 x 600

PORT CLOSING

Prestroke	mm	:	3.3 ± 0.05
Rod position	mm	:	-
Port closing mark Cyl. No.	:	:	-
Cam sequence	:	:	1 - 3 - 4 - 2

Port closing mark Cyl. No.	:	:	-
Port closing difference °NW	:	:	0-90-180-270

Tolerance	+- °C:	0.50 (0.75)
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Continued (Test values)

Injection Quantity :

Adjusting Point	Rod Pos. (mm)	Speed (rpm)	Injection Q'ty (cc/1000 str.)	Difference (%)	Fixed	Remarks
A	10.4	1250	40.4 - 42.4	± 2.5	Lever	Basic
B	approx. 8.8	450	9.4 - 13.4	± 15	Rack	

Timing Advance Specification :

Speed (rpm)							
Advance Angle (deg)							

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Injection pumps



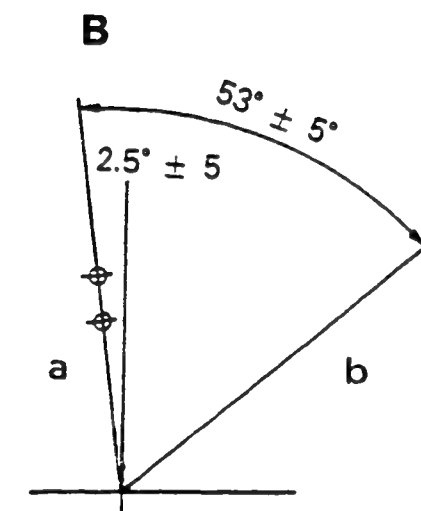
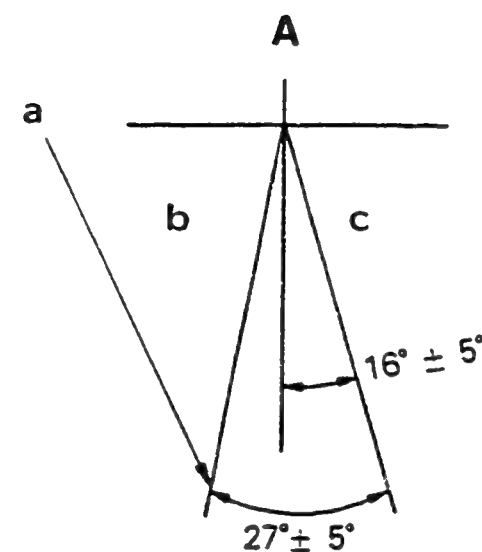
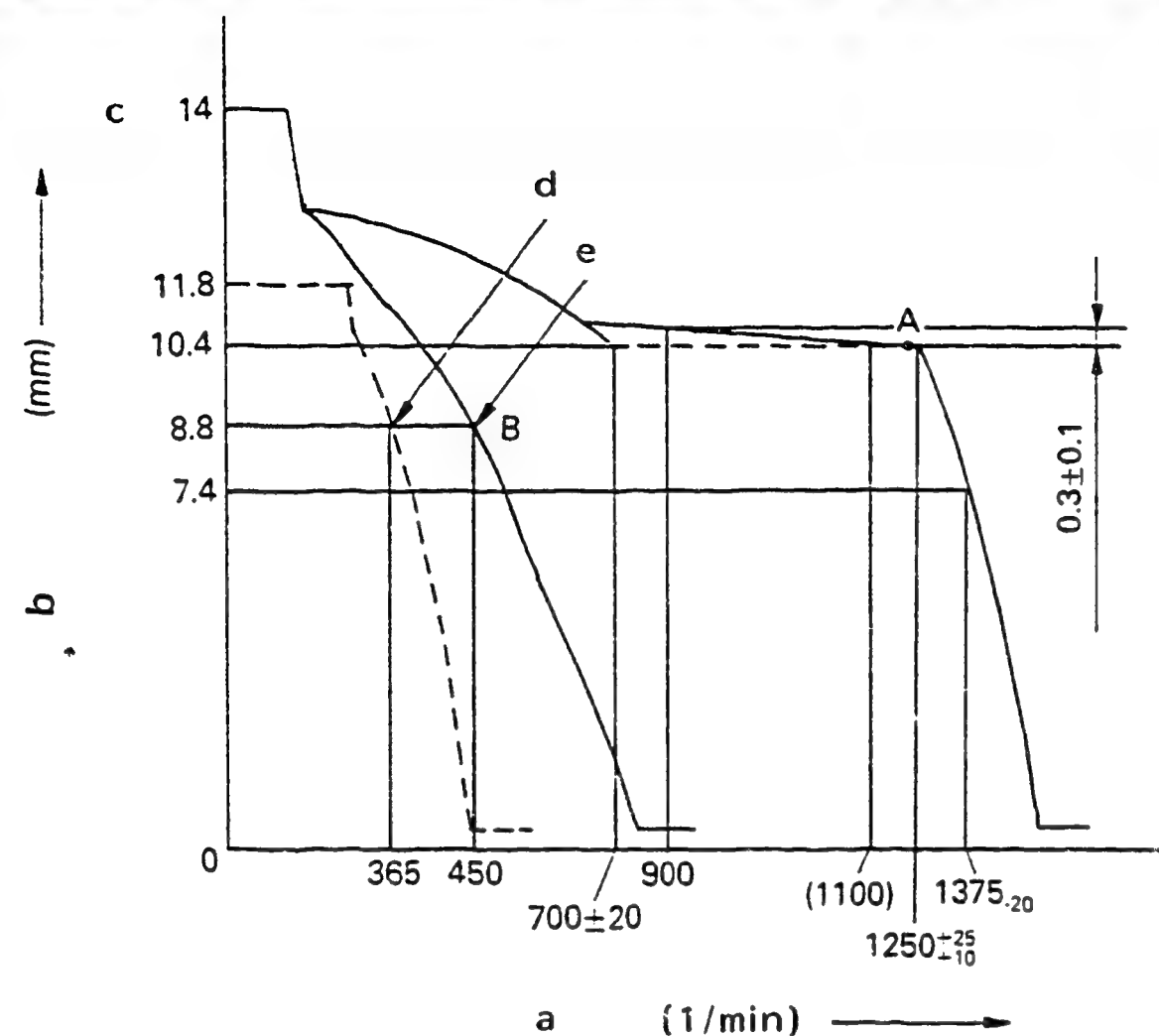


Fig. 5

GOVERNOR ADJUSTMENT

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- a = Pump speed
- b = Control rack position
- c = above
- d = Idle sub spring set
- e = Main spring set

A = Speed control lever angle

B = Stop lever angle

- a = Stopper bolt set
- b = Idling
- c = Full-speed

- a = Normal
- b = Stop

Note

- Before adjustment, remove the idling sub spring.
- Move the control lever fully in the stop direction, and set the minimum-speed stopper bolt so that the control rack position is 0.5 - 1.0 mm.

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■ ADJUSTMENT

	Pump speed (rpm)	Rack position (mm)	Remarks
Full-load Adjustment (Temporary)	1260 - 1275 1250	10.4 10.4	<ul style="list-style-type: none"> • Adjust using control lever • Adjust using screw (1)
Torque Control spring Adjustment	500 680 - 720 900 (1100)	12.1 10.4 10.6 - 10.8 10.4	<ul style="list-style-type: none"> • Adjust using spring cap.(3) • Confirm • Adjust using spring cap.(2) • Confirm the torque stroke
Maximum-speed Adjustment	1260 - 1275	10.4	<ul style="list-style-type: none"> • Adjust using screw (5)
Idle sub Adjustment	365 0 450 -	8.8 11.8 8.8 -	<ul style="list-style-type: none"> • Adjust using spring cap (2) • Fix the control lever • Adjust using control lever • Confirm
Confirm High-Idling speed (Install the cover on governor cover)	1250 1355 - 1375	10.4 7.4	<ul style="list-style-type: none"> • Adjust using screw (6) • Adjust using control lever
Control Lever Angle Measurement	<ul style="list-style-type: none"> • Measure the control lever angle at the "idling" and "full" positions. • When the control lever is depressed toward the "full" position, replace the shifter's shim with a thicker one. • When the control lever is depressed toward the "idling" position, replace the shifter's shim with a thinner one. 		

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Injection pumps

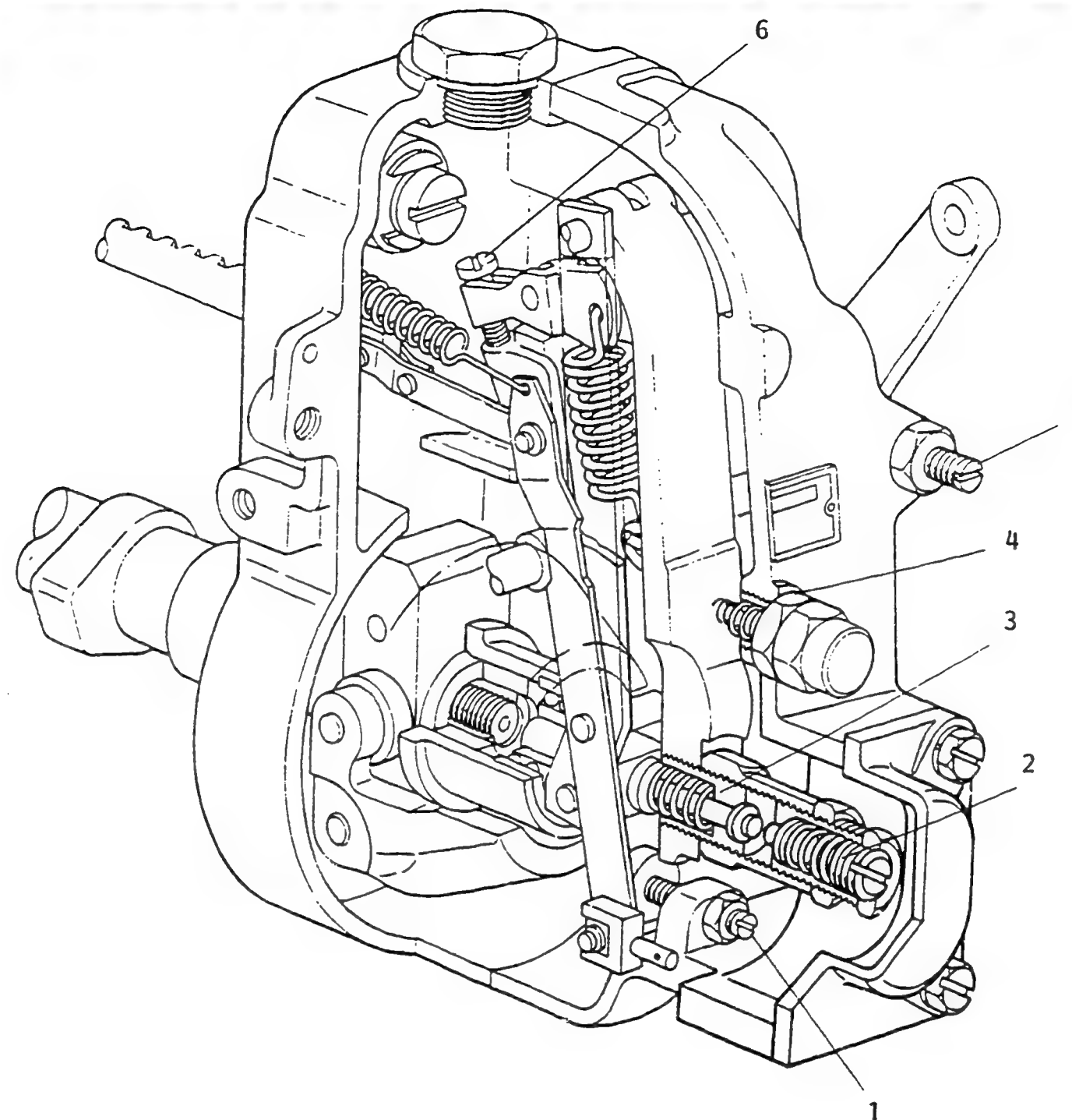


Fig. 6

- 1 = Screw
- 2 = Spring capsule
- 3 = Spring capsule
- 4 = Spring capsule
- 5 = Screw
- 6 = Screw

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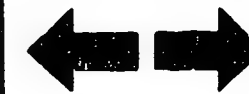
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ZEXEL - Test values
Injection pumps



ZEXEL - TEST VALUES
Injections pumps

BOSCH No.	:	9 400 610 107	1/5
ZEXEL No.	:	101602-0931	
Date	:	25.06.1990	[1]
Company	:	ISUZU	
Engine	:	6BD1-T / 115601-2243	

IP-Type number	:	101060-8660 / PES6A
Governor type number	:	105410-6520 / EP/RSV

TEST PREREQUISITES

Test oil	:	ISO-4113
Test oil inlet temperature °C	:	40.00...45.00
Inlet pressure	bar :	1.6
Test nozzle holder combination	:	1 688 901 013
Opening pressure	bar :	175
Test pressure line		
Inner x Outer Dia - Length	mm :	2.00 x 6.00 x 600

PORT CLOSING

Prestroke	mm :	3.4 ± 0.05
Rod position	mm :	-
Port closing mark	Cyl. No. :	-
Cam sequence	:	1-5-3-6-2-4
Port closing mark	Cyl. No. :	-
Port closing difference	°NW :	0-60-120-180-240-300
Tolerance	+ - °C :	0.50 (0.75)



Injection Quantity :

Adjusting Point	Rod Pos. (mm)	Speed (rpm)	Injection Q'ty (cc/1000 str.)	Difference (%)	Fixed	Remarks
A	8.5	800	71.5 - 74.5	± 2.5	Lever	Basic
B	approx. 5.4	400	8.1 - 10.7	± 14	Rack	
				-		

Timing Advance Specification :

Speed (rpm)							
Advance Angle (deg)							



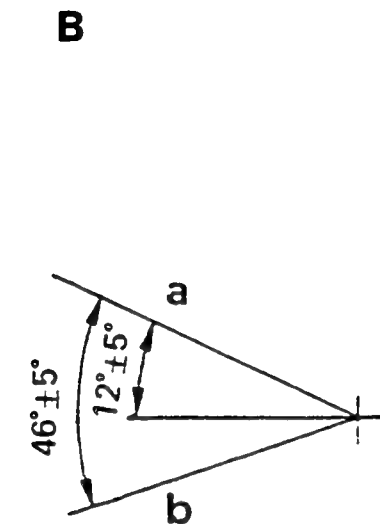
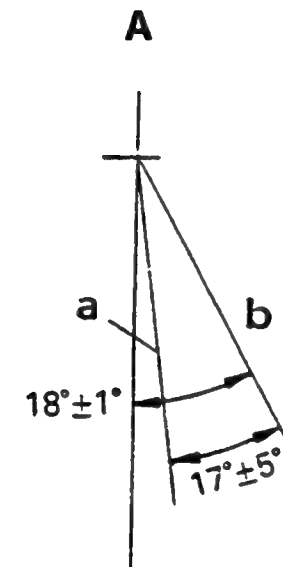
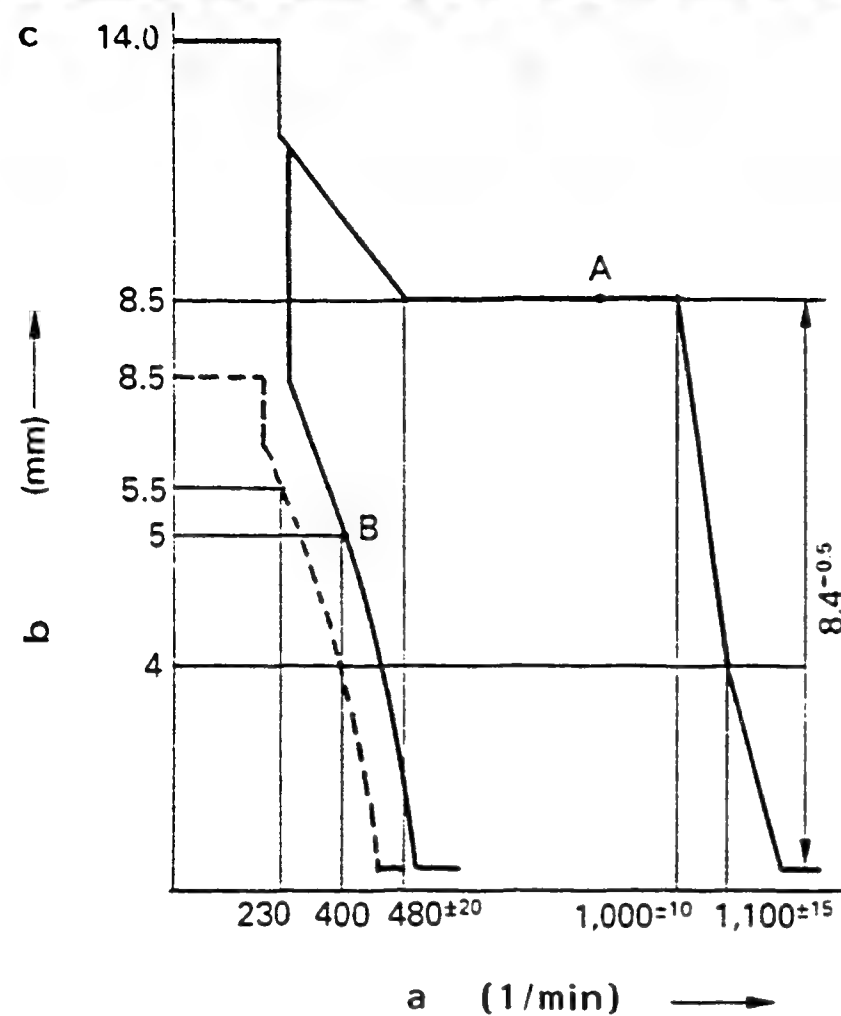


Fig. 7

GOVERNOR ADJUSTMENT

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a = Pump speed
b = Control rack position
c = above

A = Control lever angle
a = Full-speed
b = Idling

B = Stop lever angle
a = Normal
b = Stop

Note

- Before adjustment, remove the idling sub spring.
- Move the control lever fully in the stop direction, and set the minimum-speed stopper bolt so that the control rack position is 0.5 - 1.0 mm.

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Injection pumps



B5

ZEXEL - Test values
Injection pumps



	Pump speed (rpm)	Rack position (mm)	Remarks
Full-load Adjustment (Temporary)	1000 - 1010 800	8.5 8.5	<ul style="list-style-type: none"> • Adjust using control lever • Adjust using screw (1)
Idling Adjustment	400 0 230	5.0 8.5 5.5	<ul style="list-style-type: none"> • Fix the control lever • Fix the control lever • Adjust using spring cap.(3)
Maximum-speed Adjustment	1000 - 1010 1095 - 1125 460 - 500 - -	8.5 4.0 8.5 - -	<ul style="list-style-type: none"> • Adjust using screw (4) • Confirm speed droop, adjust using screw (5) • Adjust using spring cap.(2) • Confirm • Confirm
Full-load Adjustment (Install the cover on governor cover)	800	8.5	<ul style="list-style-type: none"> • Adjust using screw (2)
Control Lever Angle Measurement	<ul style="list-style-type: none"> • Measure the control lever angle at the "idling" and "full" positions. • When the control lever is depressed toward the "full" position, replace the shifter's shim with a thicker one. • When the control lever is depressed toward the "idling" position, replace the shifter's shim with a thinner one. 		



■ TIMING SETTING

At No. 1 plunger's beginning of injection position

B.T.D.C.: 18°

■ Note

There is a danger of the swivel lever interfering with the flyweight.
Strictly observe the following.

The limit when setting the speed at which the governor is actuated is $N = 1350$.

At this speed, the maximum number of notches that the adjusting screw can be turned through is 19.

When the rated speed at which the governor is actuated is $N = 1000$, the maximum number of notches that the adjusting screw can be turned through is 20.

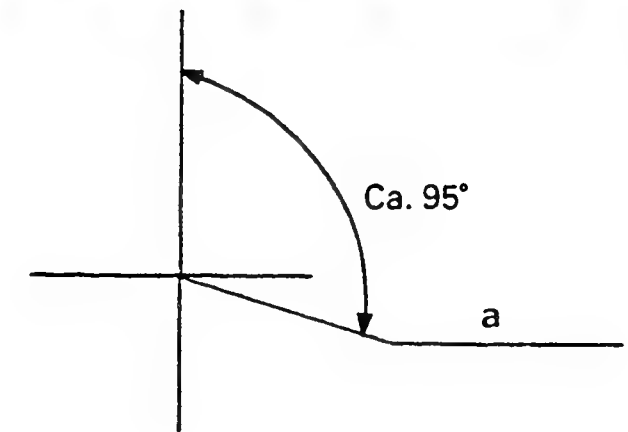


Fig. 8

Pump center line

a = Mark "C-C"

B8

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Injection pumps



B9

ZEXEL - Test values

Injection pumps



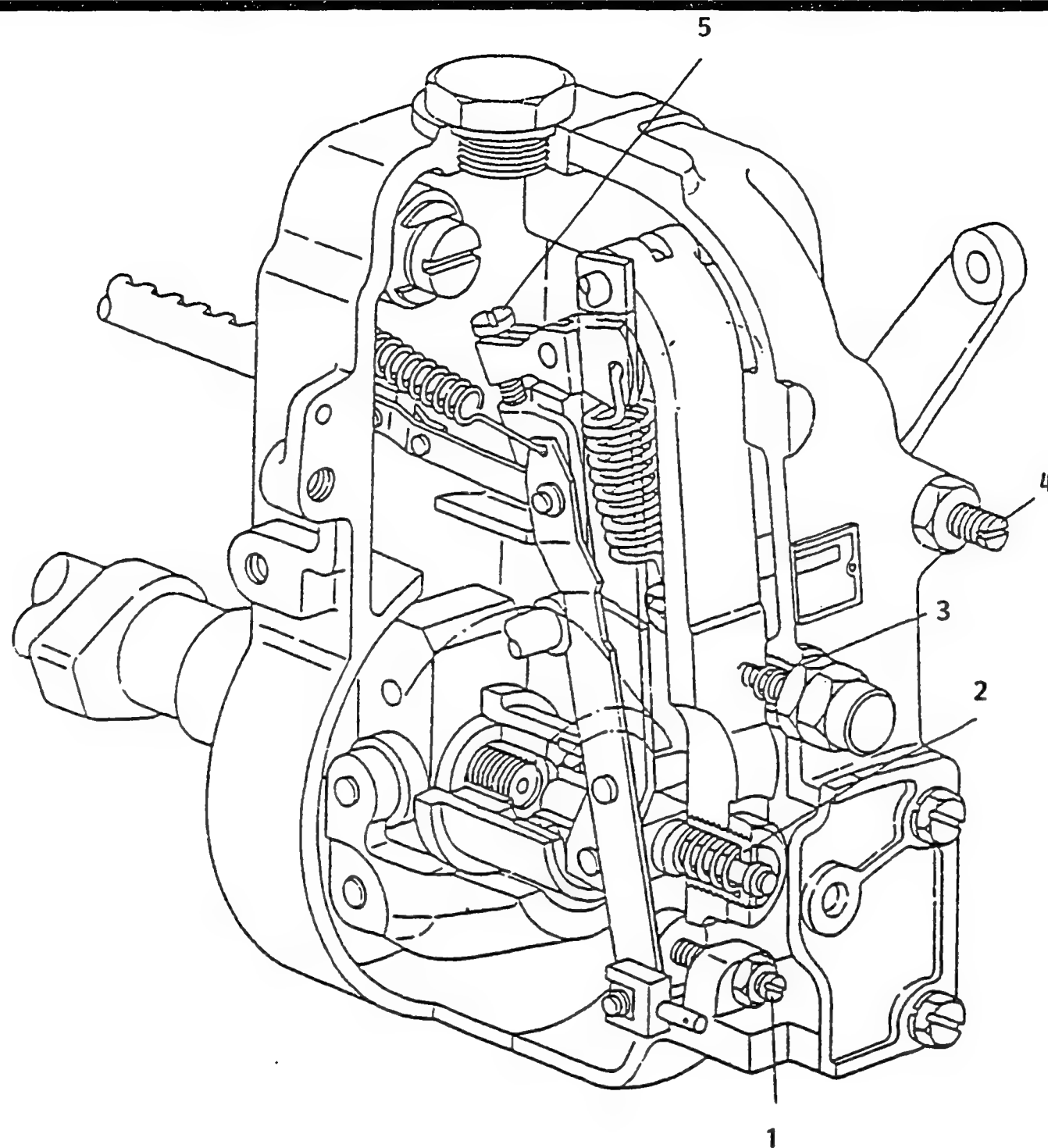


Fig. 9

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- 1 = Screw
- 2 = Spring capsule
- 3 = Spring capsule
- 4 = Screw
- 5 = Screw

B10

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Injection pumps



B11

ZEXEL - Test values
Injection pumps



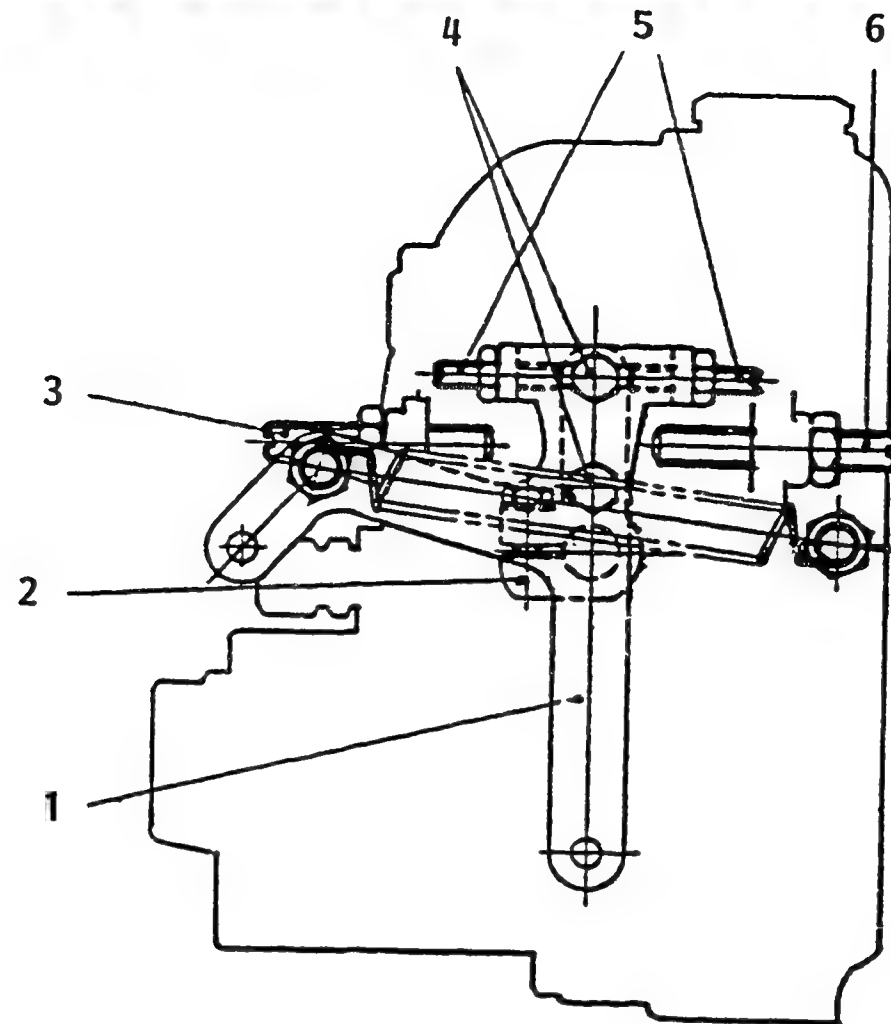


Fig. 10

1 = Lever

2 = Lever

3 = Bolt

4 = Bolt

5 = Bolt

6 = Bolt

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■ REDUCTION LEVER ADJUSTMENT

Using bolts (3) and (6), fix lever (2) in the position where pump speed begins to increase.

Then, fix lever (1) at $18 \pm 1^\circ$ using bolt (5) and then lock it using bolt (4).

After completing idling adjustment, loosen bolt (6) and move lever (1) to the full-speed position. Fix it in this position using bolt (6).

The shape and position of this lever may vary.

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B13

ZEXEL - Test values

Injection pumps



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BOSCH No.	:	9 400 610 116	1/4
ZEXEL No.	:	101602-3780	
Date	:	25.06.1990	[0]
Company	:	KOMATSU	
Engine	:	6D105 / 6136721311	

IP-Type number	:	101060-2470 / PES6A
Governor type number	:	105410-6670 / EP/RSV

TEST PREREQUISITES

Test oil	:	ISO-4113
Test oil inlet temperature °C	:	40.00...45.00
Inlet pressure bar	:	1.6
Test nozzle holder combination	:	1 688 901 013
Opening pressure bar	:	175
Test pressure line		
Inner x Outer Dia - Length mm	:	2.00 x 6.00 x 600

PORT CLOSING

Prestroke	mm	:	3.3 ± 0.05
Rod position	mm	:	-
Port closing mark Cyl. No.	:	:	-
Cam sequence	:	:	1-5-3-6-2-4
Port closing mark Cyl. No.	:	:	-
Port closing difference °NW	:	:	0-60-120-180-240-300
Tolerance	+ - °C	:	0.50 (0.75)



Continued (Test values)

Injection Quantity :

Adjusting Point	Rod Pos. (mm)	Speed (rpm)	Injection Q'ty (cc/1000 str.)	Difference (%)	Fixed	Remarks
A	10.1	1075	47.5 - 49.5	± 2	Rack	Basic
H	approx. 7.1	425	7.0 - 9.0	± 4	Rack	
A	10.1	1075	47.5 - 49.5	± 2	Lever	
B	(11.3)	800	55.5 - 59.5	± 4	Lever	

Timing Advance Specification :

Speed (rpm)							
Advance Angle (deg)							

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Injection pumps



B16

ZEXEL - Test values
Injection pumps



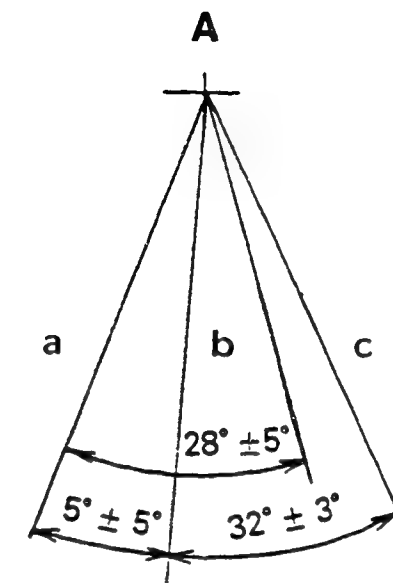
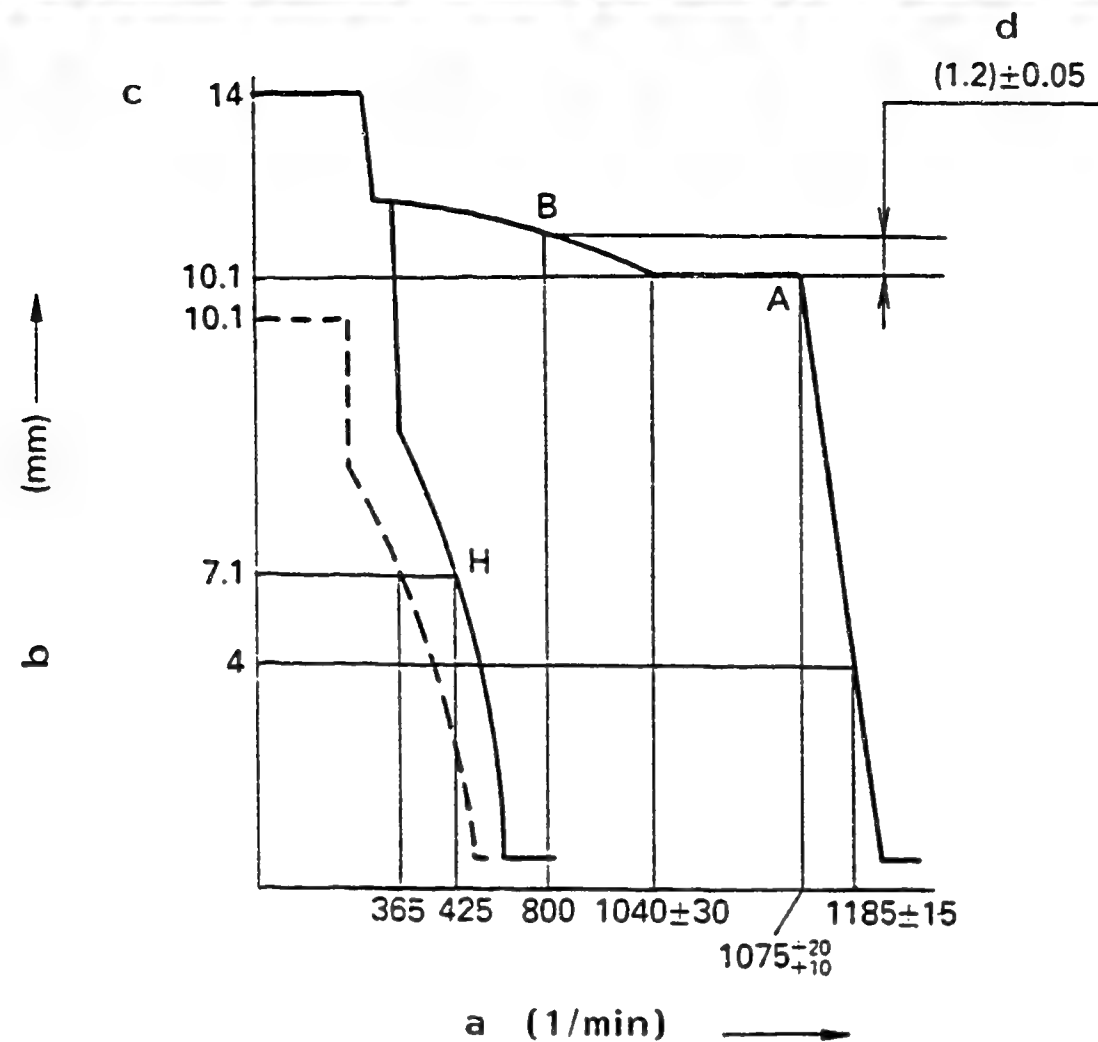


Fig.11

GOVERNOR ADJUSTMENT

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- a = Pump speed
- b = Control rack position
- c = above
- d = Difference in control rack positions between 1075 rpm and 800 rpm

A = Stop lever angle

- a = Full-speed
- b = Idling
- c = Stop

Note

- Before adjustment, remove the idling sub spring.
- Move the control lever fully in the stop direction, and set the minimum-speed stopper bolt so that the control rack position is 0.5 - 1.0 mm.

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Injection pumps



B18

ZEXEL - Test values
Injection pumps



	Pump speed (rpm)	Rack position (mm)	Remarks
Full-speed Adjustment (Temporary)	1085 - 1095	10.1	• Adjust using screw (1)
Full-load Adjustment	1075	10.1	• Adjust using screw (5)
Torque Control spring Adjustment	800 1010 - 1070	11.3 10.1	• Adj. using spring cap. (4) • Confirm
Idling Adjustment	425 0 365 -	approx. 7.1 - approx. 7.1 -	• Fix control lever • Freely position the control lever • Adjust using spring capsule (3) • Confirm
Maximum-speed Adjustment	1085 - 1095 1170 - 1200 1250	10.1 4.0 0.1 - 0.6	• Adjust using screw (1) • Adjust speed droop using screw (2) • Confirm
Full-load Adjustment (Install the cover on governor cover)	1075	10.1	• Adjust using screw (1)
Control Lever Angle Measurement	<ul style="list-style-type: none"> • Measure the control lever angle at the "idling" and "full" positions. • When the control lever is depressed toward the "full" position, replace the shifter's shim with a thicker one. • When the control lever is depressed toward the "idling" position, replace the shifter's shim with a thinner one. 		
Rack Limiter Adjustment	-		• Adjust using screw (5)



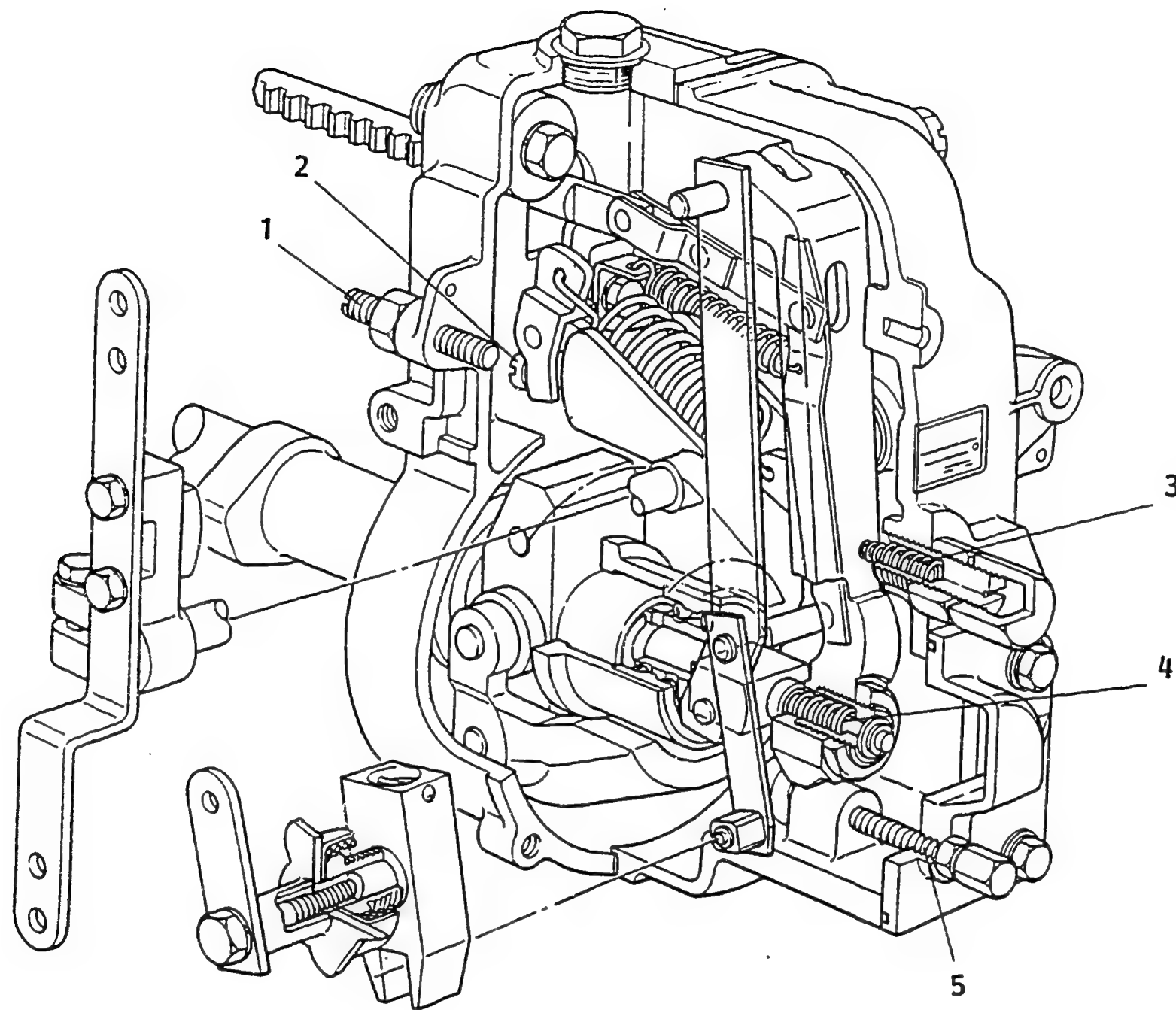


Fig. 12

- 1 = Screw
- 2 = Screw
- 3 = Spring capsule
- 4 = Spring capsule
- 5 = Screw

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B21

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B22

ZEXEL - Test values
Injection pumps



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BOSCH No.	:	9 400 610 103	1/5
ZEXEL No.	:	101692-3051	
Date	:	25.06.1990	{4}
Company	:	KOMATSU	
Engine	:	6D95L / 6206-71-1130	

IP-Type number	:	101069-9121 / PES6A
Governor type number	:	105400-3090 / EP/RSV

TEST PREREQUISITES

Test oil	:	ISO-4113
Test oil inlet temperature °C	:	40.00...45.00
Inlet pressure	bar :	1.6
Test nozzle holder combination	:	1 688 901 013
Opening pressure	bar :	175
Test pressure line		
Inner x Outer Dia - Length	mm :	2.00 x 6.00 x 600

PORT CLOSING

Prestroke	mm :	3.6 ± 0.05
Rod position	mm :	-
Port closing mark	Cyl. No. :	-
Cam sequence	:	1-5-3-6-2-4

Port closing mark	Cyl. No. :	-
Port closing difference	°NW :	0-60-120-180-240-300

Tolerance	+ - °C:	0.50 (0.75)
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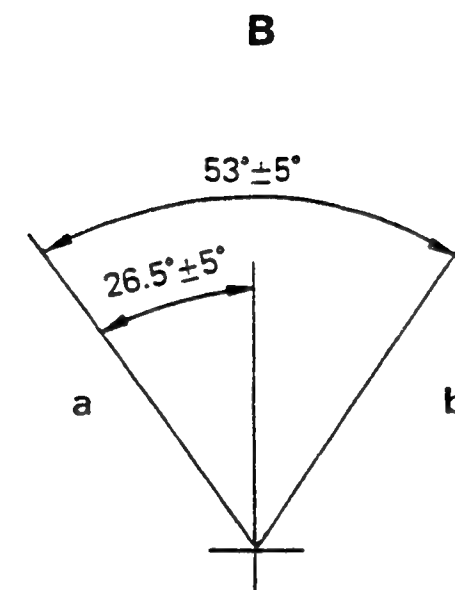
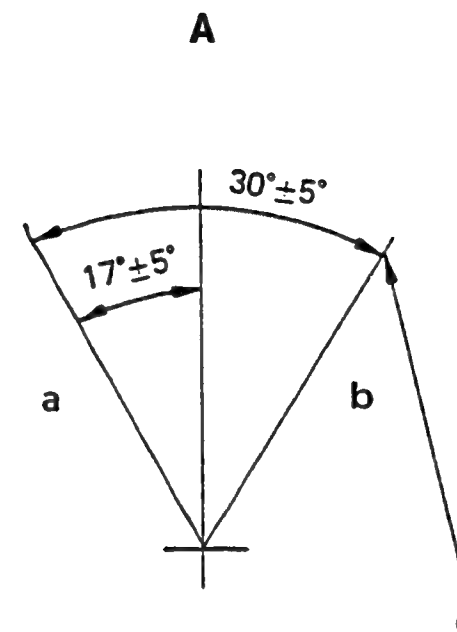


Injection Quantity :

Adjusting Point	Rod Pos. (mm)	Speed (rpm)	Injection Q'ty (cc/1000 str.)	Difference (%)	Fixed	Remarks
A	9.7	1075	30.0 - 32.0	± 2.5	Lever	Basic
B	approx.10.3	350	9.5 - 11.5	± 15	Rack	

Timing Advance Specification :

Speed (rpm)							
Advance Angle (deg)							



GOVERNOR ADJUSTMENT

101692-3051 2/5

A = Speed control lever angle

a = Full-speed

b = Idling

c = Stopper bolt set

B = Stop lever angle

a = Normal

b = Stop

■ Note

1. Before adjustment, remove the idling sub spring and the torque control spring.
2. Move the control lever fully in the stop direction, and set the minimum-speed stopper bolt so that the control rack position is 0.5.- 1.0 mm.
3. There is a danger of the swivel lever interfering with the flyweight. Strictly observe the following.

The limit when setting the speed at which the governor is actuated is $N = 1300$.

At this speed, the maximum number of notches that the adjusting screw can be turned through is 10.

When the rated speed at which the governor is actuated is $N = 1200$, the maximum number of notches that the adjusting screw can be turned through is 15.

When the rated speed at which the governor is actuated is $N = 1100$, the maximum number of notches that the adjusting screw can be turned through is 20.



	Pump speed (rpm)	Rack position (mm)	Remarks
Full-speed Adjustment (Temporary)	1085 - 1095	9.7	• Adjust using the control lever
	950	9.7	• Adjust using screw (1)
Torque Control spring Adjustment	400	11.0 - 11.4	• Adj.using spring cap.(2)
	750	10.0 - 10.2	• Confirm
	(860)	9.7	• Confirm
	-	-	• Confirm the torque contr. stroke is 1.5 ± 0.2 mm.
Idling Adjustment	0	11.7	• Fix the control lever
	350	8.7	• Adjust using spring capsule (3)
	-	-	• Confirm
Maximum-speed Adjustment	1065 - 1095	9.7	• Adjust using screw (1)
	1150 - 1200	6.0	• Confirm speed droop, adjust using screw (5)
			• Confirm
			• Confirm
Full-load Adjustment (Install the cover on governor cover)	1075	9.7	• Adjust using screw (4)
Control Lever Angle Measurement	<ul style="list-style-type: none"> • Measure the control lever angle at the "idling" and "full" positions. • When the control lever is depressed toward the "full" position, replace the shifter's shim with a thicker one. • When the control lever is depressed toward the "idling" position, replace the shifter's shim with a thinner one. 		
Rack Limiter Adjustment	-	Approx. 13	



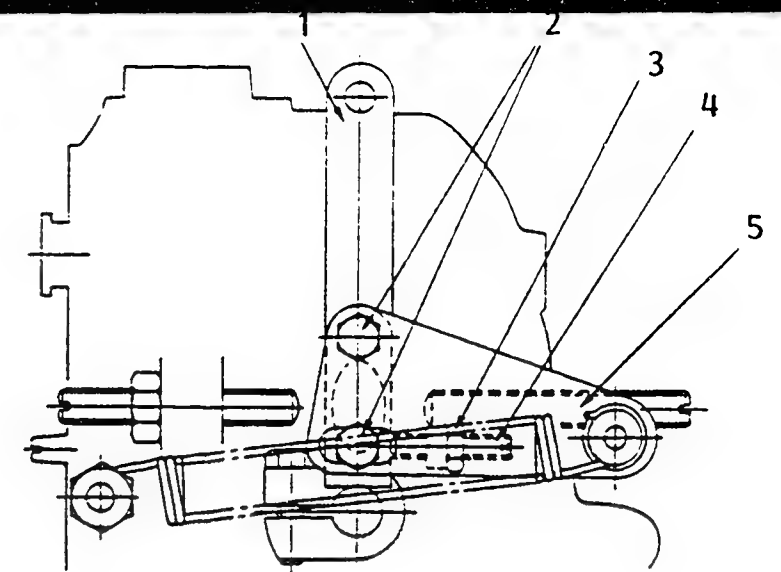


Fig. 14

- 1 = Lever
- 2 = Screw
- 3 = Bolt
- 4 = Screw
- 5 = Lever

■ CONTROL LEVER REACTION FORCE ADJUSTMENT

1. Loosen bolt (2) a little.
Using bolt (4), move the cancel spring's hooking point to find the position specified in the specifications.
Fix bolt (4) using nut (3), and fix the lever (5) using bolt (2).
2. After adjusting the control lever's reaction force, operate the pump at 350 rpm, gradually move the control lever from the FULL position and confirm that it returns to the idling position.
Control lever reaction force: 0.4 kg-m.
This is the force required at high idling (1175 ± 15 rpm) to move the speed lever from the position where it contacts the stopper bolt when positioned at the FULL side.
3. Confirm that the control lever returns to the idling position when it is moved from the stop position.



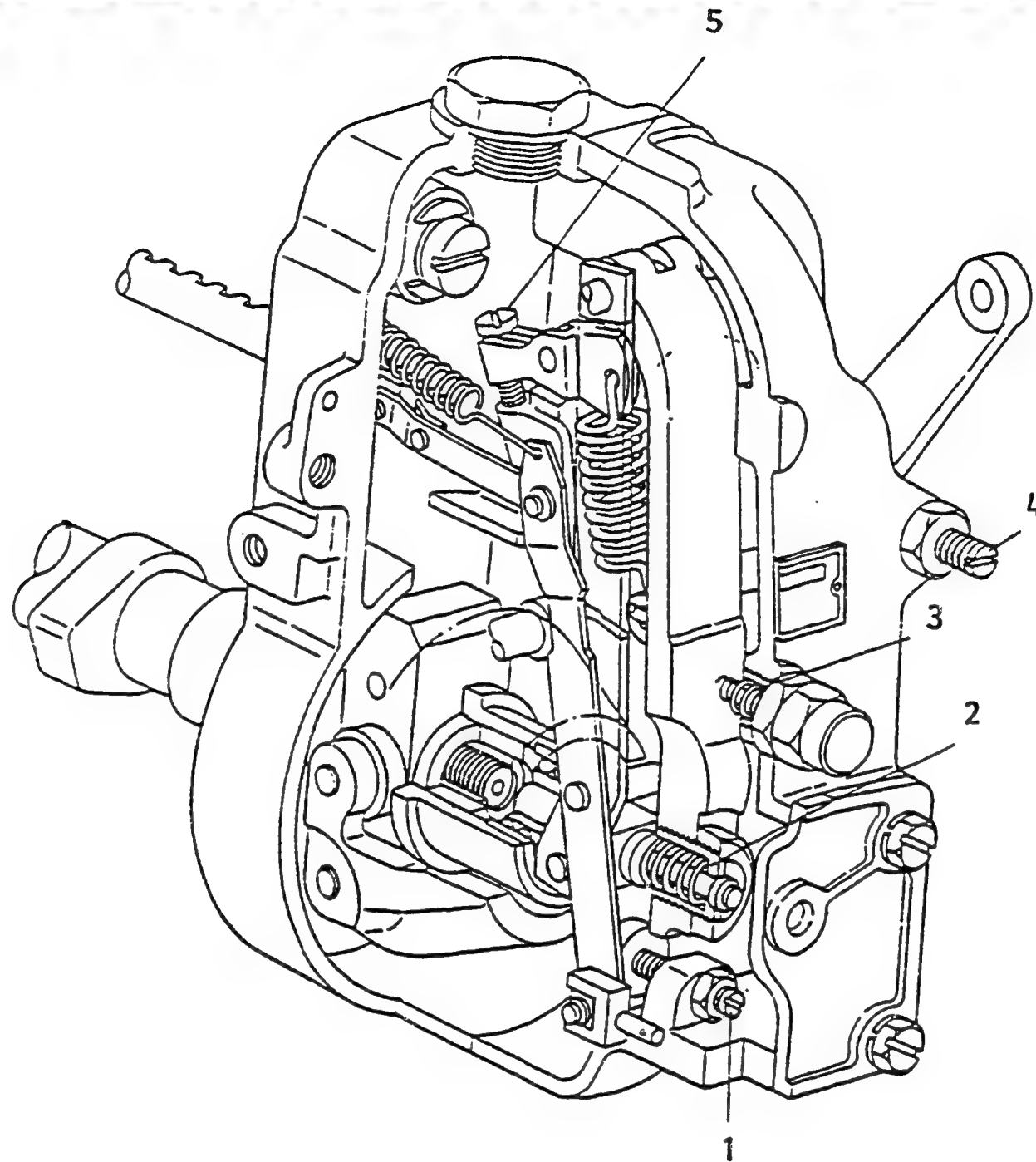


Fig. 15

- 1 = Screw
- 2 = Spring capsule
- 3 = Spring capsule
- 4 = Screw
- 5 = Screw

101692-3051 5/5

C11

ZEXEL - Test values
Injection pumps



C12

ZEXEL - Test values
Injection pumps



ZEXEL - TEST VALUES
Injections pumps

BOSCH No.	:	9 400 610 120	1/4
ZEXEL No.	:	101803-1370	
Date	:	25.06.1990	[0]
Company	:	MITSUBISHI	
Engine	:	8DC40A / 31261-72024	

IP-Type number	:	101080-0590 / PE8AD
Governor type number	:	105490-4010 / EP/RFD

TEST PREREQUISITES

Test oil	:	ISO-4113
Test oil inlet temperature °C	:	40.00...45.00
Inlet pressure	bar :	1.6
Test nozzle holder combination	:	1 688 901 013
Opening pressure	bar :	175
Test pressure line		
Inner x Outer Dia - Length	mm :	2.00 x 6.00 x 600

PORT CLOSING

Prestroke	mm :	3.6 ± 0.05
Rod position	mm :	-
Port closing mark	Cyl. No. :	-
Cam sequence	:	1-2-7-3-4-5-6-8
Port closing mark	Cyl. No. :	-
Port closing difference	°NW :	0-45-90-135-180-225- 270-315
Tolerance	+ - °C :	0.50 (0.75)



Continued (Test values)

Injection Quantity :

Adjusting Point	Rod Pos. (mm)	Speed (rpm)	Injection Q'ty (cc/1000 str.)	Difference (%)	Fixed	Remarks
	9.6	800	96.1 - 101.9	-	Rack	Basic
H	approx.7.6	200	17.0 - 23.0	-	Rack	
A	R (approx.9.6)	800	98.0 - 100.0	-	Lever	
B	R (approx.9.6)	1200	$qA+2.0 \leq qB \leq qA+7$	8.2	Lever	
D	-	100	90.0 - 130.0	-	Lever	

Timing Advance Specification : EP/SA
105641-4190

Speed (rpm)	380	500	900	1200			
Advance Angle (deg)	START	0.5-1.5	3.7-4.7	6.5-7.5			

C14

ZEXEL - Test values
Injection pumps



C15

ZEXEL - Test values
Injection pumps



	Pump Speed (rpm)	Rack Position (mm)	Remarks
Flyweight Lift and Full-Load Position	700 - 800	9.6	• Speed control lever: temporary setting
	approx. 1400	approx. 0.6	• Adjust using screw (1)
	Decrease pump speed to 1250^{+20} (rpm) and adjust the high speed lift value ($9.0 + 0.5$) using screw (3).		
Idling Adjustment	570 - 600	3.6 - 4.6	• Adjust using screw (2)
	200	7.6	• Adjust using spring cap.(4)
	435 - 465	3.6 - 4.6	• Confirm
	200	7.6	• Confirm
			• Confirm the control lever angle is ($-4^{\circ} \dots 6^{\circ}$).
Damper Spring Setting	Maintain the pump speed at 200 rpm and set the control rod at the 7.6 mm position using the control lever. Then, gradually increase the pump speed until the rod position is $7.6^{-0.2}$ mm. Tighten the damper spring capsule and fix it in the position where it begins to move the rod from the $7.6^{-0.2}$ mm position.		
Maximum Speed Starting Point and Speed Droop Check	Fix the load control lever in the full-load position and fix the speed control lever in the full-speed position		
	1250 - 1270	9.6	• Adjust using screw (6)
	1315 - 1335	6.2	• Adjust using spring capsule
	approx.1325	-	• No injection
Micro Switch Adjustment	325 - 330	7.5	• Fix the load control lever
			• Adjust switch "ON", using screw (9).
Smoke Limiter Setting	Fix the load control lever in the full-load position.		
	400	9.6 - 9.8	• Adjust using smoke limiter.
	100	-	• Confirm injection quantity at point "D".



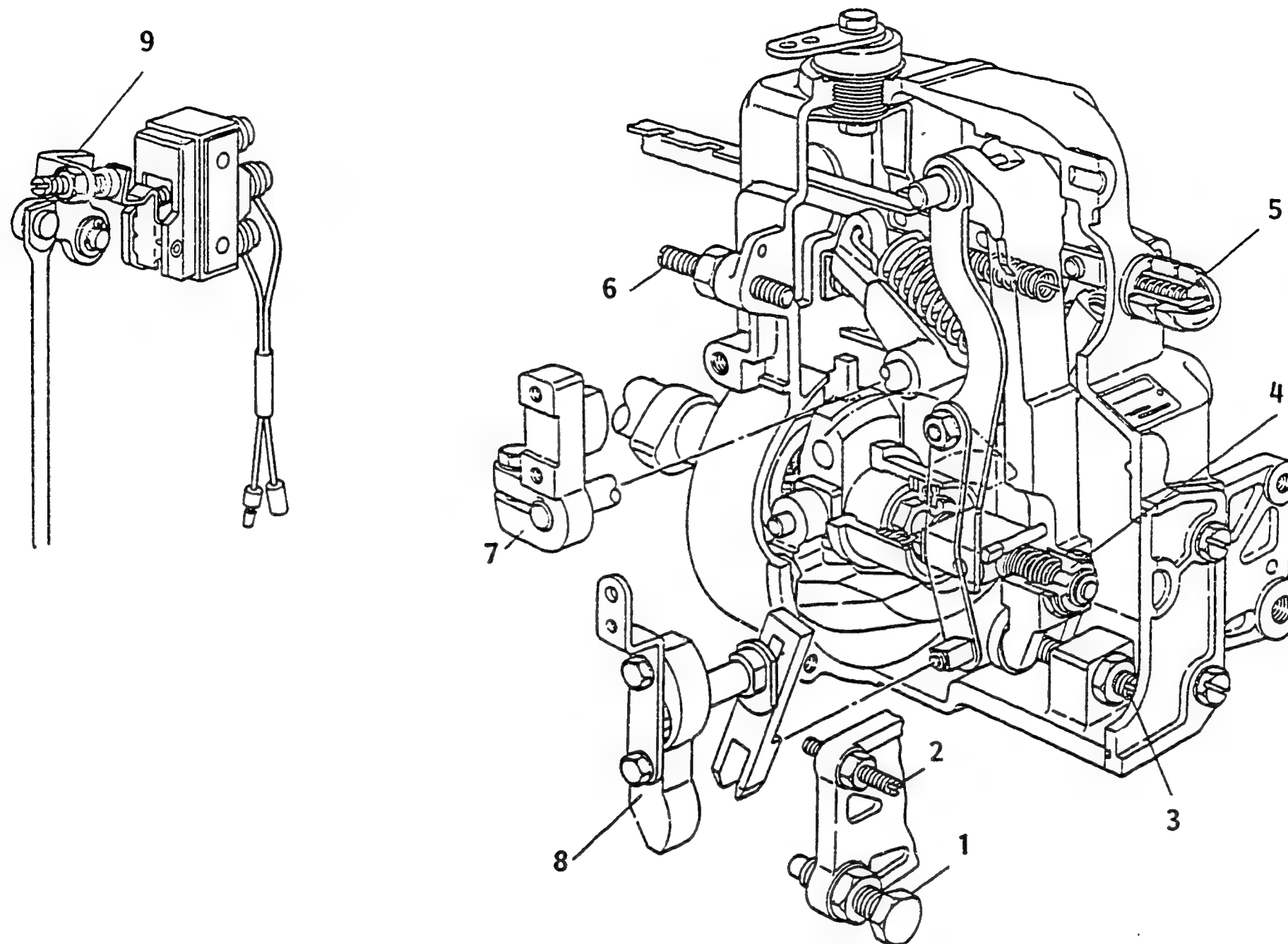


Fig. 17

- 1 = Screw
- 2 = Screw
- 3 = Screw
- 4 = Spring capsule
- 5 = Damper spring capsule

- 6 = Screw
- 7 = Speed control lever
- 8 = Load control lever
- 9 = Screw

101803-1370 4/4

C20

ZEXEL - Test values
Injection pumps



C21

ZEXEL - Test values
Injection pumps



ZEXEL - TEST VALUES
Injections pumps

BOSCH No.	:	9 400 610 121	1/3
ZEXEL No.	:	104302-6161	
Date	:	25.06.1990	[0]
Company	:	ISUZU	
Engine	:	2AB1 / 515601-1840	

IP-Type number	:	104300-0281 / PES2K
Governor type number	:	-

TEST PREREQUISITES

Test oil	:	ISO-4113
Test oil inlet temperature °C	:	40.00...45.00
Inlet pressure	bar :	1.6
Test nozzle holder combination	:	1 688 901 013
Opening pressure	bar :	175
Test pressure line		
Inner x Outer Dia - Length	mm :	2.00 x 6.00 x 600

PORT CLOSING

Prestroke	mm :	2.1 ± 0.05
Rod position	mm :	-
Port closing mark	Cyl. No. :	-
Cam sequence	:	1 - 2
Port closing mark	Cyl. No. :	-
Port closing difference	°NW :	0 - 90
Tolerance	+ - °C:	0.50 (0.75)



Injection Quantity :

Adjusting Point	Rod Pos. (mm)	Speed (rpm)	Injection Q'ty (cc/1000 str.)	Difference (%)	Fixed	Remarks
A	9.7	1200	44.0 - 46.0	± 2.5	Lever	
B	approx. 5.2	350	5.3 - 7.3	± 14	Rack	
				-		

Timing Advance Specification :

Speed (rpm)							
Advance Angle (deg)							



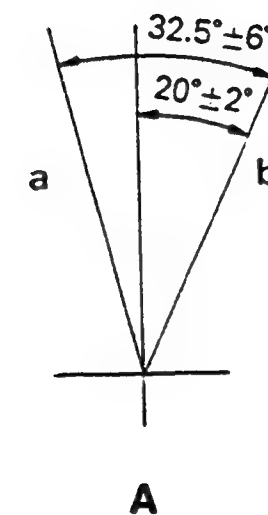
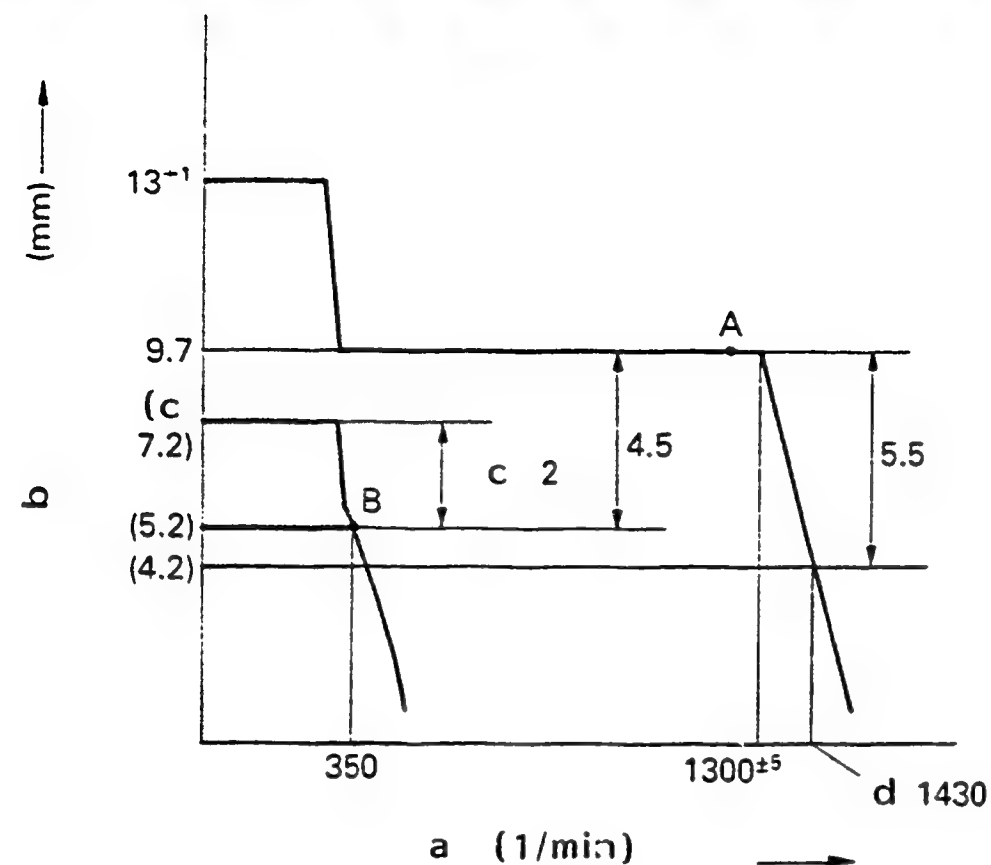


Fig. 18

GOVERNOR ADJUSTMENT

104302-6161 2/3

a = Pump speed
b = Control rack position
c = above
d = below

A = Speed control lever angle
a = Idling
b = Full-speed

D4

ZEXEL - Test values
Injection pumps



D5

ZEXEL - Test values
Injection pumps



	Pump speed (rpm)	Rack position (mm)	Remarks
Full-Load Stopper Bolt Adjustment	1200 1200	9.7 9.7	<ul style="list-style-type: none"> • Adjust using screw (4) • Confirm injection quantity at point A. • Confirm the control lever angle (18° - 22°)
Maximum Speed Adjustment	Fix the control lever in the full-speed position		
	1295 - 1305 below 1430	9.7 (4.2)	<ul style="list-style-type: none"> • Adjust using screw (4) • Confirm
Idling adjustment	350 0	(5.2) above 7.2	<ul style="list-style-type: none"> • Adjust using idling spring guide • Confirm

D6

ZEXEL - Test values
Injection pumps



D7

ZEXEL - Test values
Injection pumps



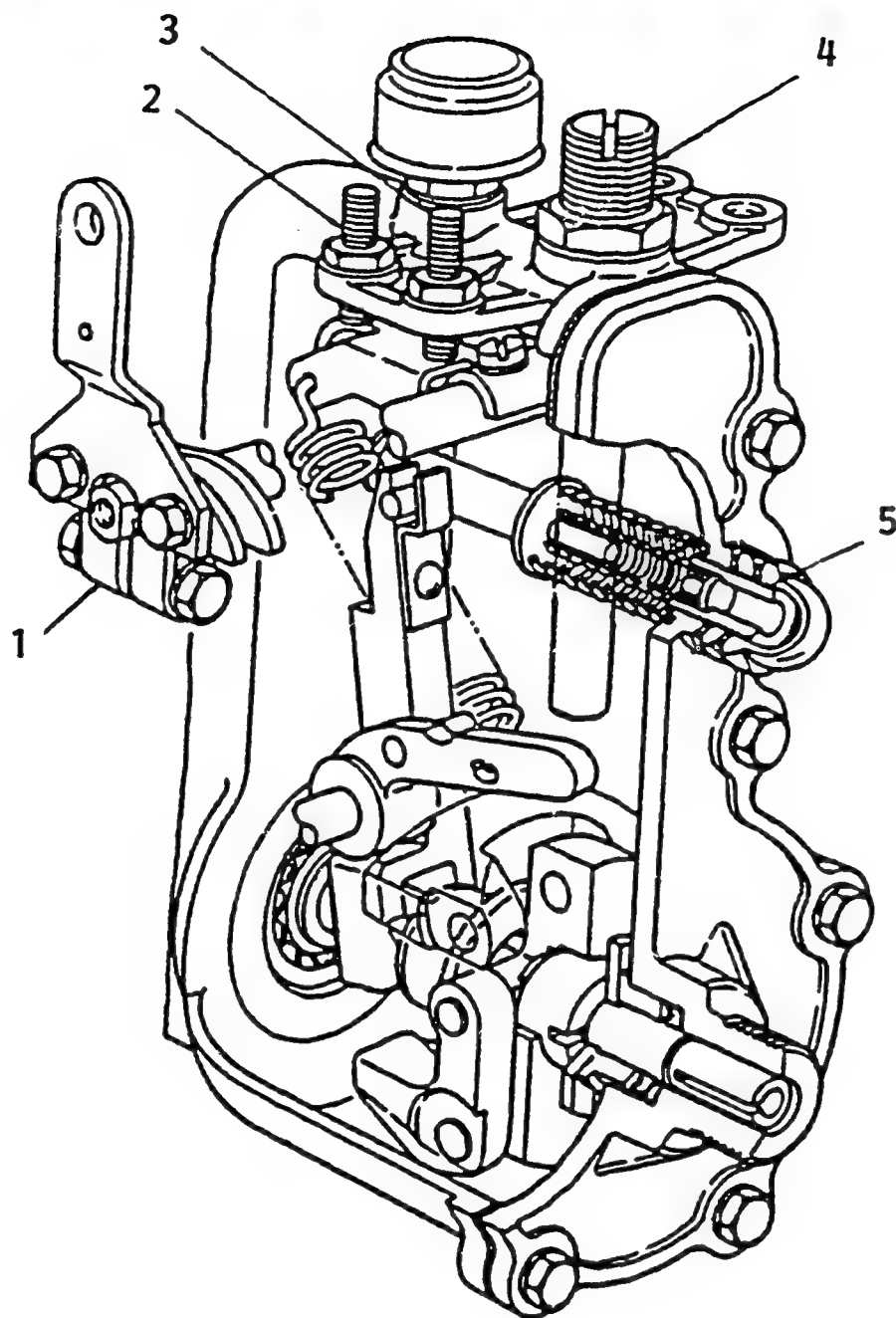


Fig. 19
 1 = Control lever
 2 = Screw
 3 = Screw
 4 = Screw
 5 = Idling spring guide

104302-6161 3/3

D8

ZEXEL - Test values
 Injection pumps



D9

ZEXEL - Test values
 Injection pumps



ZEXEL - TEST VALUES
Injections pumps

BOSCH No.	:	9 400 610 117	1/3
ZEXEL No.	:	104304-3091	
Date	:	25.06.1990	[1]
Company	:	ISUZU	
Engine	:	4FA1 / 515601-3641	

IP-Type number	:	104300-4121 / PES4K
Governor type number	:	-

TEST PREREQUISITES

Test oil	:	ISO-4113
Test oil inlet temperature °C	:	40.00...45.00
Inlet pressure bar	:	1.6
Test nozzle holder combination	:	1 688 901 013
Opening pressure bar	:	175
Test pressure line		
Inner x Outer Dia - Length mm	:	2.00 x 6.00 x 600

PORT CLOSING

Prestroke	mm	:	2.1 ± 0.05
Rod position	mm	:	-
Port closing mark Cyl. No.	:	:	-
Cam sequence	:	:	1 - 3 - 4 - 2

Port closing mark Cyl. No.	:	-
Port closing difference °NW	:	0-90-180-270

Tolerance	+- °C:	0.50 (0.75)
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1/3 1/3 2/3 2/3 3/3 3/3
Injection Quantity :

Adjusting Point	Rod Pos. (mm)	Speed (rpm)	Injection Q'ty (cc/1000 str.)	Difference (%)	Fixed	Remarks
A	9.6	1000	26.3 - 29.3	± 2.5	Lever	
B	approx. 8.0	375	7.7 - 9.7	± 14	Lever	
				-		

Timing Advance Specification :

Speed (rpm)							
Advance Angle (deg)							

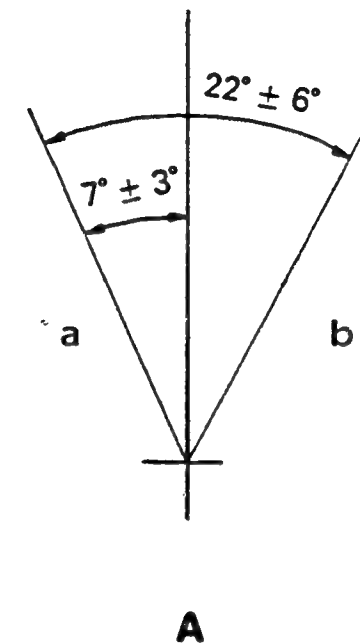
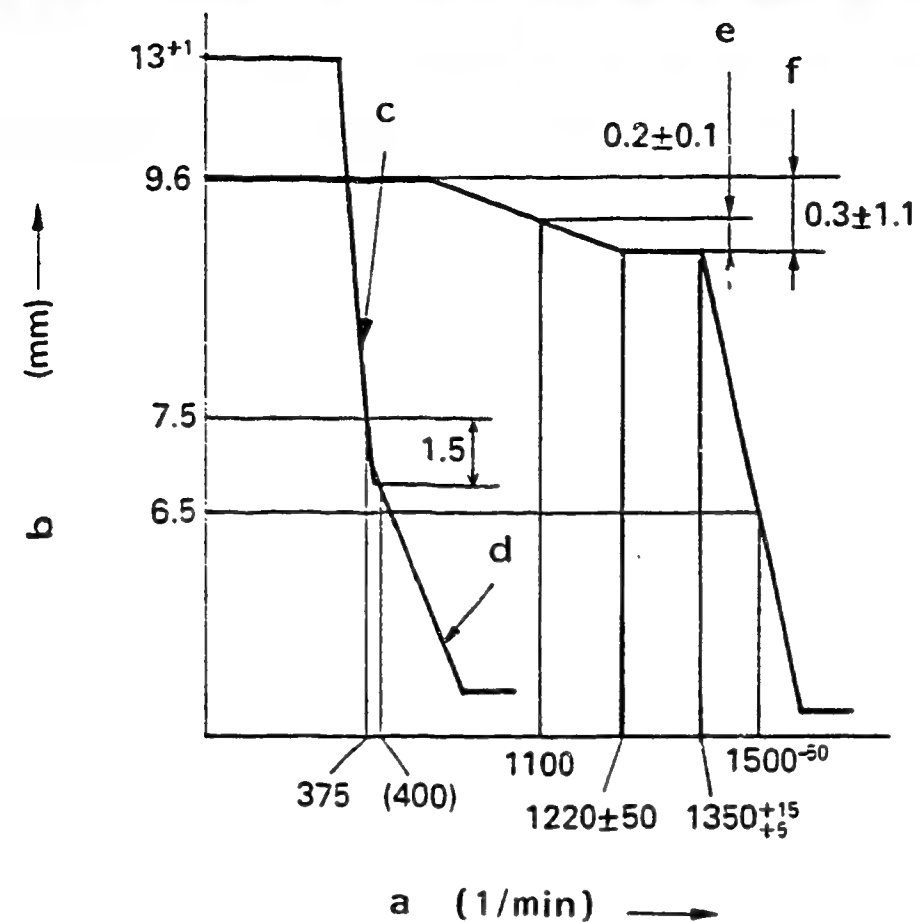


Fig. 20

GOVERNOR ADJUSTMENT

104304-3091 2/3

- a = Pump speed
- b = Control rack position
- c = Idle spring set
- d = Main spring set
- e = Difference in control rack positions between 1000 rpm and 1350 rpm
- f = Difference in control rack positions between 1100 rpm and 1350 rpm

A = Speed control lever angle

- a = Full-speed
- b = Idling

D13

ZEXEL - Test values
Injection pumps



D14

ZEXEL - Test values
Injection pumps



■ ADJUSTMENT

	Pump speed (rpm)	Rack position (mm)	Remarks
Full-Load Adjustment (Temporary)	1350	9.6	<ul style="list-style-type: none"> • Adjust using screw (5) • Confirm the control lever angle (4°- 10°)
Maximum Speed Adjustment	Fix the control lever in the full-speed position		
	1355 - 1365 1450 - 1500	9.6 6.5	<ul style="list-style-type: none"> • Confirm • Adjust using screw (2)
Idling adjustment	375	7.5	<ul style="list-style-type: none"> • Adjust using idling spring guide
	0	13 ⁺¹	<ul style="list-style-type: none"> • Confirm
Torque Control Spring Adjustment	1000 1000 1100	(9.6) 9.6 (9.4)	<ul style="list-style-type: none"> • Move the control lever • Adjust using screw (4) • Torque control stroke 0.2 mm is adjusted by shims.
	1170 - 1270	(9.3)	<ul style="list-style-type: none"> • Confirm the torque control stroke is 0.3 mm.

D15ZEXEL - Test values
Injection pumps**D16**ZEXEL - Test values
Injection pumps

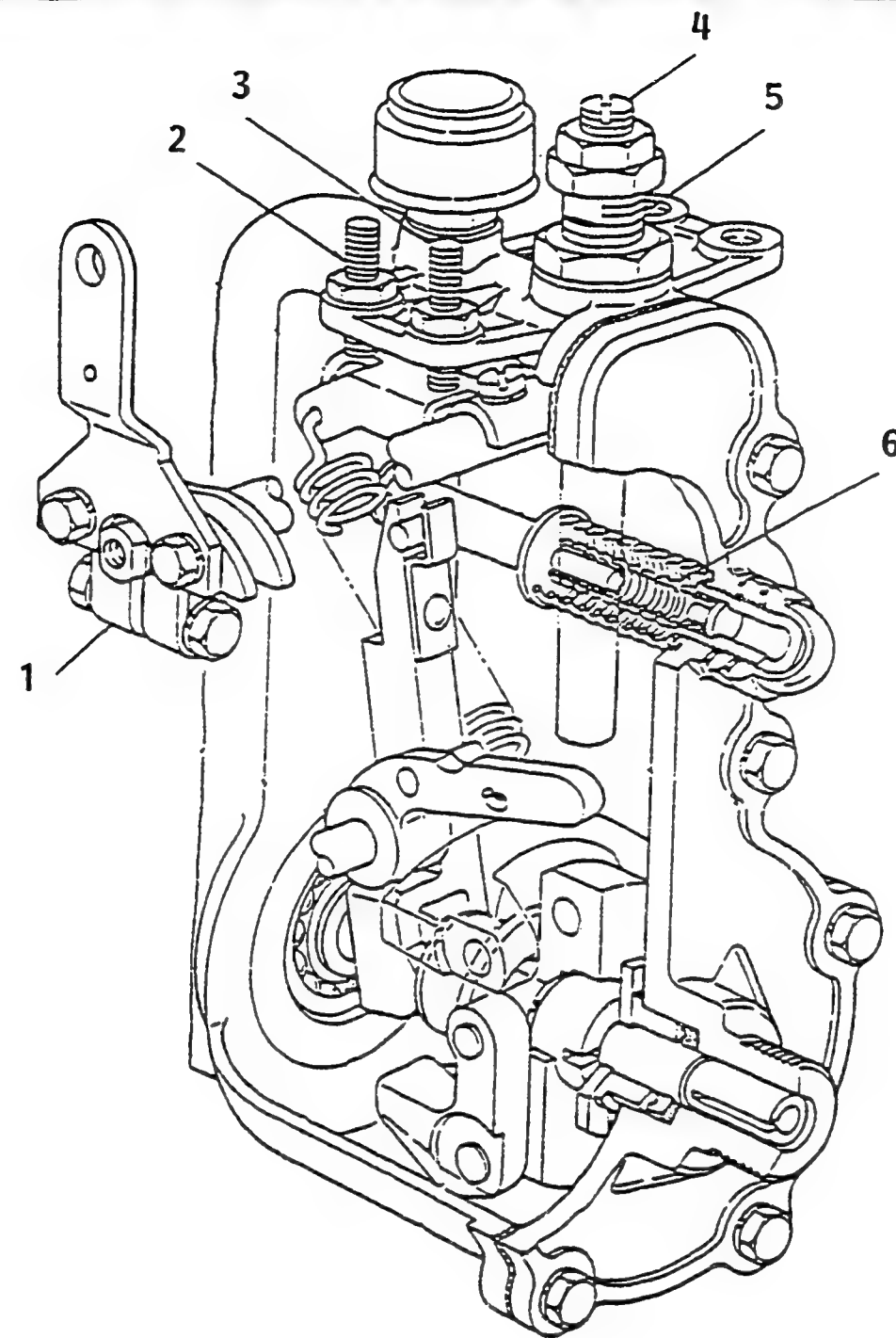


Fig. 21

- 1 = Control lever
- 2 = Screw
- 3 = Screw
- 4 = Screw
- 5 = Screw
- 6 = Idling spring guide

104304-3091 3/3

D17

ZEXEL - Test values
Injection pumps



D18

ZEXEL - Test values
Injection pumps



Test oil:		ZEXEL-TEST VALUES			1/3
ISO 4113 od		Distributors pumps			BOSCH No. 9 460 610 418
SAE J967d		Engine model:4FG1			ZEXEL No. 104740-1661
					Date: 25.6.1990 (0)
					Company: ISUZU
					No. 8943142451
Injection pump no. 104640-1341		(NP-VE4/10F2200RNP611)			
Pump rot.: clockwise-viewed from drive side					
Prestroke setting: 0.2 mm		Test-nozzle holder combination:		Test pressure line:	
		1 688 901 000		1 680 750 017	
1. Setting values		Speed (rpm)	Setting values		Charge-air pressure bar (mmHg)
1-1	Timing device travel	1750	4.0 - 4.4 (mm)		3.5
1-2	Supply pump pressure	1750	5.8 - 6.2 (kg/cm²)		
1-3	Full load deliv. without charge-air pr. Full load deliv. with charge-air pres.	1250	47.1 - 48.1 (cc/1000st) (cc/1000st)		
1-4	Idle speed regulation	425	8.3 - 12.3 (cc/1000st)		2.0
1-5	Start	100	50.0 - 70.0 (cc/1000st)		4.5
1-6	Full-load speed regulation	2500	11.0 - 17.0 (cc/1000st)		
1-7	Load-timer adjustment	1750			
1-8			Ta=0.8 ± 0.2 mm		
2. Test values					
2-1 Timing device		N = rpm mm	1250 1.6 - 2.4	1750 3.9 - 4.5	2150 5.4 - 6.4
2-2 Supply pump		N = rpm kg/cm²		1750 5.8 - 6.2	2150 6.5 - 7.1
2-3 Overflow delivery		N = rpm cc/10s		1750 57.0 - 100.0	
2-4 Fuel injection quantities					
Control lever position		Speed rpm	Fuel delivery (cc/1000 strokes)	Charge-air pres(mmHg)	Difference (cc)
End stop		600	44.6 - 49.6		
		1250	46.6 - 48.6		
		2150	36.5 - 41.5		
		2500	10.5 - 17.5		
		2850	below 5.0		
Switch off		425	0		
Idle		425	8.3 - 12.3		
stop		700	below 3.0		
2-5 Solenoid		Cut-in voltage max. 12 V Test voltage: 8 - 14 V			

3. Dimensions	
K	3.2 - 3.4 mm
KF	5.7 - 5.9 mm
MS	0.8 - 1.0 mm
BCS	- mm
Control lever angle	
α	-6° - 2° deg
A	mm
β	33° - 43° deg
B	mm
γ	- deg
C	- mm



LOAD TIMER ADJUSTMENT

1. Adjustment

1) Fix the control lever in the position satisfying the following conditions:

Boost Pressure: - mmHg
 Pump Speed : 1750 rpm
 Fuel Injection
 Quantity : 32 - 33 cc/1000st

2) With the control lever positioned as described in 1) above, adjust the governor sleeve so that the Timer Stroke conforms to the specified values (1 - 7).

Control lever position			Specified values	
Pump speed (rpm)	Fuel injection quantity (cc/1000st)	Boost pressure (mmHg)	Timer stroke (mm)	Timer stroke reduction value (mm)
1750	31.5 - 33.5	-	-	0.5 - 1.1
1750	22.0 - 25.0	-	-	1.1 - 2.1

D21

ZEXEL - Test values

Injection pumps

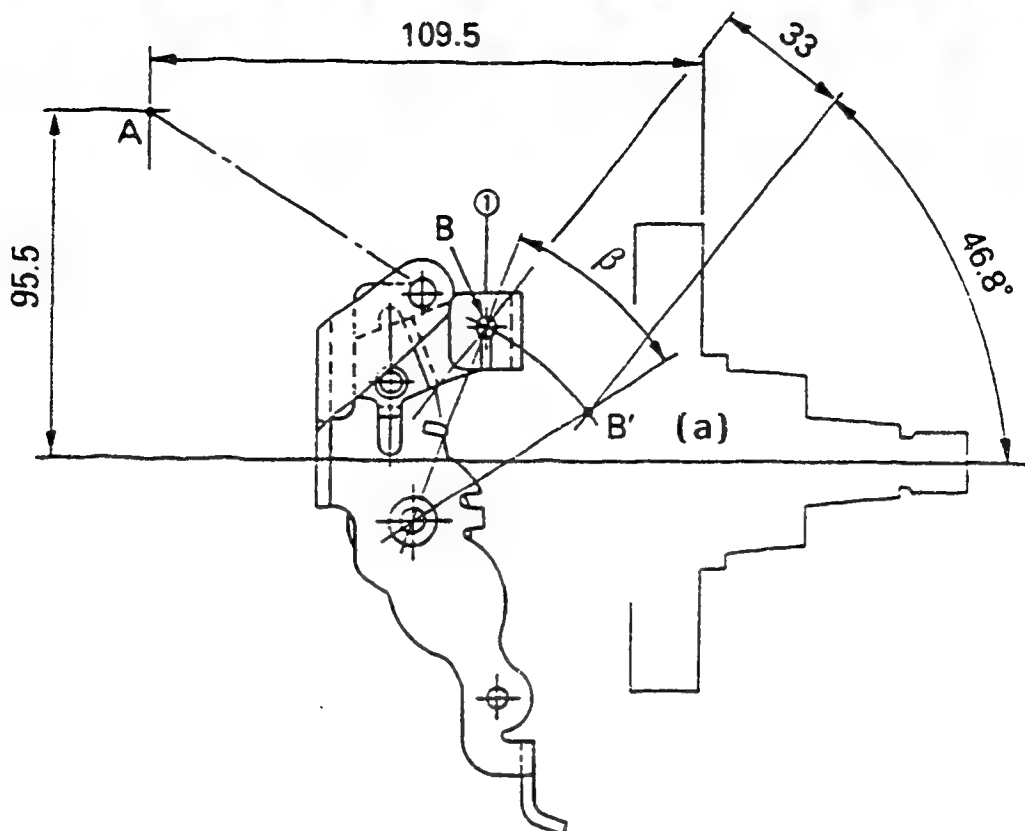


D22

ZEXEL - Test values

Injection pumps





104740-1661 3/3

Fig. 22

(a) = (Full-speed)

■ A/T-PLATE ADJUSTMENT

Choose either of 1) or 2) above and perform adjustment.

- 1) Adjust the A/T plate so that when the control lever is rotated from the idle position (B) to the full position (B'), $AB' - AB = 33 \pm 1$ mm. Then fix the plate.
- 2) Adjust the A/T plate so that when the control lever is rotated from the idle position (B) to the full position (B'), to a position 46.8° from the pump's drive shaft, the distance from B to B' is 33 ± 0.5 mm. Then fix the plate.



Test oil:		ZEXEL-TEST VALUES			BOSCH No. 9 460 610 290	
ISO 4113 od		Distributors pumps			ZEXEL No. 104740-3350	
SAE J967d		Engine model:4D55			Date: 25.6.1990 [1]	
					Company: MITSUBISHI	
					No. MD071533	
Injection pump no. 104640-3150		(NP-VE4/10F2100RNP148)				
Pump rot.: clockwise-viewed form drive side						
Prestroke setting: - mm		Test-nozzle holder combination: 1 688 901 000			Test pressure line: 1 680 750 017	
1. Setting values		Speed (rpm)	Setting values		Charge-air pressure bar (mmHg)	Difference (cc)
1-1	Timing device travel	850	1.1 - 1.5 (mm)			3.0
1-2	Supply pump pressure	1250	4.5 - 5.1 (kg/cm²)			
1-3	Full load deliv. without charge-air pr. Full load deliv. with charge-air pres.	750	32.2 - 34.2 (cc/1000st) (cc/1000st)			
1-4	Idle speed regulation	375	6.9 - 9.9 (cc/1000st)			2.5
1-5	Start	100	66.0 - 86.0 (cc/1000st)			
1-6	Full-load speed regulation	2550	13.1 - 19.1 (cc/1000st)			
1-7	Load-timer adjustment					4.0
1-8						
2. Test values						
2-1 Timing device		N = rpm mm	850 0.9 - 1.7	1750 6.1 - 7.3	2100 7.8 - 8.6	3. Dimensions
2-2 Supply pump		N = rpm kg/cm²	600 2.9 - 3.5	1250 4.5 - 5.1	2100 6.5 - 7.1	
2-3 Overflow delivery		N = rpm cc/10s	1250 48.0 - 92.0			
2-4 Fuel injection quantities						
Control lever position		Speed rpm	Fuel delivery (cc/1000 strokes)	Charge-air pres(mmHg)	Difference (cc)	Control lever angle α 55 - 63 deg A - mm β 38 - 48 deg B - mm γ - deg C - mm
End stop		750 1250 2100 2550 2900	32.7 - 34.7 36.7 - 40.7 32.2 - 36.2 11.1 - 21.1 below 5.0			
Switch off		375	0			
Idle		375	6.4 - 10.4			
stop		600	below 3.0			
2-5 Solenoid		Cut-in voltage max. 8 V Test voltage: 12 - 14 V				



Test oil:	ZEXEL-TEST VALUES			1/2	
ISO 4113 od	Distributors pumps			BOSCH No. 9 460 610 422	
SAE J967d	Engine model:4D55 (TC)			ZEXEL No. 104740-3470	
			Date:		25.6.1990 [1]
			Company:		MITSUBISHI
			No.		MD073632
Injection pump no. 104640-3160			(NP-VE4/10F2100RNP149)		
Pump rot.: clockwise-viewed from drive side			Test-nozzle holder combination:		Test pressure line:
Prestroke setting: - mm			1 688 901 000		1 680 750 017
1. Setting values			Speed (rpm)	Setting values	Charge-air pressure bar (mmHg)
1-1 Timing device travel			850	1.1 - 1.5 (mm)	0
1-2 Supply pump pressure			1250	4.5 - 5.1 (kg/cm²)	0
1-3 Full load deliv. without charge-air pr.			600	32.7 - 33.7 (cc/1000st)	0
Full load deliv. with charge-air pres.			750	36.2 - 37.2 (cc/1000st)	100 - 120
1-4 Idle speed regulation			375	6.4 - 10.4 (cc/1000st)	0
1-5 Start			100	66.0 - 86.0 (cc/1000st)	0
1-6 Full-load speed regulation			2650	19.1 - 25.2 (cc/1000st)	615 - 635
1-7 Load-timer adjustment					
1-8					
2. Test values					
2-1 Timing device		N = rpm	850	1750	2100
		mm	1.1 - 1.5	6.1 - 7.3	7.8 - 8.6
2-2 Supply pump		N = rpm	600	1250	2100
		kg/cm²	2.9 - 3.5	4.5 - 5.1	6.5 - 7.1
2-3 Overflow delivery		N = rpm	1250		
		cc/10s	58.0 - 102.0		
2-4 Fuel injection quantities					
Control lever position		Speed rpm	Fuel delivery (cc/1000 strokes)	Charge-air pres (mmHg)	Difference (cc)
End stop		600	32.2 - 34.2	0	
		750	35.7 - 37.7	100 - 120	
		1250	49.3 - 53.3	468 - 488	
		2100	42.8 - 47.8	615 - 635	
		2650	18.1 - 26.1	615 - 635	
		3050	below 10	615 - 635	
Switch off		375	0	0	
Idle		600	below 3	0	
stop		375	6.4 - 10.4	0	
Partial load		600	14.5 - 26.5		
2-5 Solenoid		Cut-in voltage max. 8 V			
		Test voltage: 12 - 14 V			
3. Dimensions					
K	3.2 - 3.4 mm				
KF	5.7 - 5.9 mm				
MS	0.8 - 1.0 mm				
BCS	4.4 - 4.6 mm				
Pre-str.	- mm				
Control lever angle					
α	55 - 63 deg				
A	- mm				
β	41 - 51 deg				
B	- mm				
γ	11.5 - 12.5 deg				
C	- mm				



Note:

1. After adjustment of full load fuel injection quantity (600 rpm, 32.7 - 33.7 cc/1000st), set the boost pressure at 100 - 120 mmHg, and at a pump speed of 750 rpm adjust the fuel injection quantity using the BCS spring set screw.
2. Confirm that Q is within the specifications even when the boost pressure exceeds 700 mmHg.
3. Lever's partial load position.



Test oil		ZEXEL-TEST VALUES					1/2	
ISO 4113 od		Distributor pumps					BOSCH No. 9 460 610 406	
SAE J967d		Engine model: 4D56-T					ZEXEL No. 104740-3822	
							Date: 25.6.1990 [0]	
							Company: MITSUBISHI	
							No. MD138252	
Injection pump no.:104640-3822		(NP-VE4/10F2100RNP802)						
Pump rotation: clockwise-viewed from drive side		Test-nozzle holder combination: 1 688 901 000			Test pressure line: 1 680 750 017			
1. Setting values		Speed (rpm)	Setting values			Charge-air pressure bar (mmHg)		Difference (cc)
1-1	Timing device travel	1250	3.5 - 3.9 (mm)			540 - 560		
1-2	Supply pump pressure	1250	4.5 - 5.1 (kg/cm²)			540 - 560		
1-3	Full load deliv. without charge air pr.	750(BCS)	61.9 - 62.9 (cc/1000st)			320 - 340		
	Full load deliv. with charge air press.	1250 (FULL)	66.4 - 67.4 (cc/1000st)			540 - 560		4.5
1-4	Idle speed regulation	375	8.5 - 11.5 (cc/1000st)			0		2.0
1-5	Start	100	63.0 - 83.0 (cc/1000st)			0		
1-6	Full-load speed regulation	2650	22.2 - 28.2 (cc/1000st)			540 - 560		5.5
1-7	Load-timer adjustment	1250	(mm)			540 - 560		
1-8			T=0.4 - 0.8 (mm)					
2. Test values								
2-1 Timing device		N = rpm	500	750	1250	1750	2100	
		mm	0.6-1.8	1.4-2.6	3.3-4.1	5.2-6.4	6.6-7.8	
2-2 Supply pump		N = rpm		600	1250		2100	
		kg/cm²		2.9-3.5	4.5-5.1		6.5-7.1	
2-3 Overflow delivery		N = rpm			1250			
		cc/10s			48 - 92			
2-4 Fuel injection quantities								
Speed control lever pos.		Speed (rpm)	Fuel delivery (cc/1000st)		Charge-air pres(mmHg)		Difference (cc)	
End stop		600	42.8 - 47.8		0			
		750 (BCS)	61.4 - 63.4		320 - 340			
		1250(FULL)	65.9 - 67.9		540 - 560			
		2100	59.9 - 64.9		540 - 560			
		2650	21.7 - 28.7		540 - 560			
		3050	below 5.0		540 - 560			
Switch off		375	0		0			
Idle-stop		375	8.0 - 12.0		0			
		750	below 3.0		0			
2-5 Solenoid		Cut-in voltage max. 8 V Test voltage: 12 - 14 V						

3. Dimensions	
K	3.2 - 3.4 mm
KF	5.7 - 5.9 mm
MS	0.6 - 0.8 mm
BCS	6.0 - 6.2 mm
Prestr.	0.94 - 0.98 mm
Control lever angle	
α	55 - 63 deg
A	9.8 - 16.3 mm
β	35 - 47 deg
B	11.2 - 15.1 mm
γ	- deg
C	- mm
Full-str	7.4 - 8.2 mm

E1

ZEXEL - Test values
Injection pumps



E2

ZEXEL - Test values
Injection pumps



1. Adjustment

1) Fix the control lever in the position satisfying the following conditions:

Boost Pressure: 540 - 560 mmHg
 Pump Speed : 1250 rpm
 Fuel Injection
 Quantity : 52.8 - 53.8 cc/1000st

2) With the control lever positioned as described in 1) above, adjust the governor sleeve so that the Timer Stroke conforms to the specified values (1 - 7).

Control lever position			Specified values	
Pump speed (rpm)	Fuel injection quantity (cc/1000st)	Boost pressure (mmHg)	Timer stroke (mm)	Timer stroke reduction value (mm)
1250	52.3 - 54.3	-	(3 1)	0.2 - 1.0
1250	38.7 - 41.7	-	(2.3)	0.8 - 2.0

After adjustment of full load fuel injection quantity (1250 rpm, 66.4 - 67.4 cc/1000st) set the boost pressure at 330 mmHg or 0.45 kg/cm², and at a pump speed of 750 rpm adjust the fuel injection quantity using the BCS spring set screw.

To adjust the timer stroke supply boost pressure of 550 mmHg (0.75 kg/cm²), move the control lever to a position where the full-load injection quantity can be obtained, and then adjust the timer stroke.



Test oil		ZEXEL-TEST VALUES					1/4	
ISO 4113 od		Distributor pumps					BOSCH No. 9 460 610 431	
SAE J967d		Engine model: 4D56					ZEXEL No. 104740-3831	
							Date: 25.6.1990 [0]	
							Company: MITSUBISHI	
							No. MD138253	
Injection pump no.:104640-3831		(NP-VE4/10F2100RNP650)						
Pump rot.: clockwise-viewed from drive side		Test-nozzle holder combination:					Test pressure line:	
Prestroke setting: - mm		1 688 901 000					1 680 750 017	
1. Setting values		Speed (rpm)	Setting values			Charge-air pressure bar (mmHg)	Difference (cc)	
1-1	Timing device travel	1250	3.5 - 3.9 (mm)			540 - 560	4.5	
1-2	Supply pump pressure	1250	4.5 - 5.1 (kg/cm²)			540 - 560		
1-3	Full load deliv. with charge air press.	1250	61.4 - 62.4 (cc/1000st)			540 - 560		
	Full load deliv. with charge air press.	750	60.4 - 61.4 (cc/1000st)			320 - 340	2.0	
1-4	Idle speed regulation	375	10.5 - 13.5 (cc/1000st)			0		
1-5	Start	100	63.0 - 83.0 (cc/1000st)			0		
1-6	Full-load speed regulation	2650	22.2 - 28.2 (cc/1000st)			540 - 560	5.5	
1-7	Load-timer adjustment	1250	T=0.4 - 0.8 (mm)			540 - 560		
1-8								
2. Test values								
2-1 Timing device	N = rpm mm	500 0.6-1.8	750 1.4-2.6	1250 3.3-4.1	1750 5.2-6.4	2100 6.6-7.8	3. Dimensions	
2-2 Supply pump	N = rpm kg/cm²	600 2.9-3.5	1250 4.5-5.1	2100 6.5-7.1				
2-3 Overflow delivery	N = rpm cc/10s	1250 48 - 92						
2-4 Fuel injection quantities								
Speed control lever pos.	Speed (rpm)	Fuel delivery (cc/1000st)	Charge-air pres (mmHg)	Difference (cc)				
End stop	1250	60.9 - 62.9	540 - 560					
	600	45.8 - 50.8	0					
	750	59.9 - 61.9	320 - 340					
	2100	52.8 - 57.8	540 - 560					
	2650	21.7 - 28.7	540 - 560					
	3050	below 5.0	540 - 560					
Switch off	375	0	0					
Idle-stop	750	below 3.0	0					
	375	10.0 - 14.0	0					
2-5 Solenoid	Cut-in voltage max. 8 V Test voltage: 12 - 14 V							

K	3.2 - 3.4 mm
KF	5.7 - 5.9 mm
MS	0.9 - 1.1 mm
BCS	3.6 - 3.8 mm
Prestr.	0.84 - 0.88 mm
Control lever angle	
α	19 - 27 deg
A	8.9 - 12.3 mm
β	35 - 47 deg
B	11.2 - 15.1 mm
γ	- deg
C	- mm
Full-str	7.4 - 8.2 mm

Note

- After adjustment of full load fuel injection quantity (1250 rpm), set the boost pressure at 330 mmHg or 0.45 kg/cm², and at pump speed of 750 rpm adjust the fuel injection quantity using the BCS spring set screw.

Note

- To adjust the timer stroke, supply boost pressure of 550 mmHg (0.75 kg/cm²), move the control lever to a position where the full-load injection quantity can be obtained, and then adjust the timer stroke.

- **POTENTIOMETER ADJUSTMENT**

Under the following conditions, alter the potentiometer's installation position so that the out-put voltage equals the specified value.

Adjustment Conditions			Specified Value	Remarks
Control lever position	Pump speed (rpm)	Fuel injection quantity (cc/1000st)	Out-put voltage (V)	
Measure	750	21.3 - 23.3	4.0 ± 0.03	Adjust. point
Idle	-	-	above 1	Check point
Full speed	-	-	(8.6)	Check point

(In-put voltage: 10V)

E7

ZEXEL - Test values
Injection pumps

**E8**

ZEXEL - Test values
Injection pumps



1. Adjustment

1) Fix the control lever in the position satisfying the following conditions:

Boost Pressure: 540 - 560 mmHg
 Pump Speed : 1250 rpm
 Fuel Injection
 Quantity : 49.8 - 50.8 cc/1000st

2) With the control lever positioned as described in 1) above, adjust the governor sleeve so that the Timer Stroke conforms to the specified values.

2. Confirmation of Timer Characteristics

Fix the control lever in the position satisfying the following conditions, and confirm the Timer Stroke.

Control lever position			Specified values	
Pump speed (rpm)	Fuel injection quantity (cc/1000st)	Boost pressure (mmHg)	Timer stroke (mm)	Timer stroke reduction value (mm)
1250	49.3 - 51.3	540 - 560	(3 1)	0.2 - 1.0
1250	38.7 - 41.7	540 - 560	(2.3)	0.8 - 2.0

E9

ZEXEL - Test values

Injection pumps



E10

ZEXEL - Test values

Injection pumps



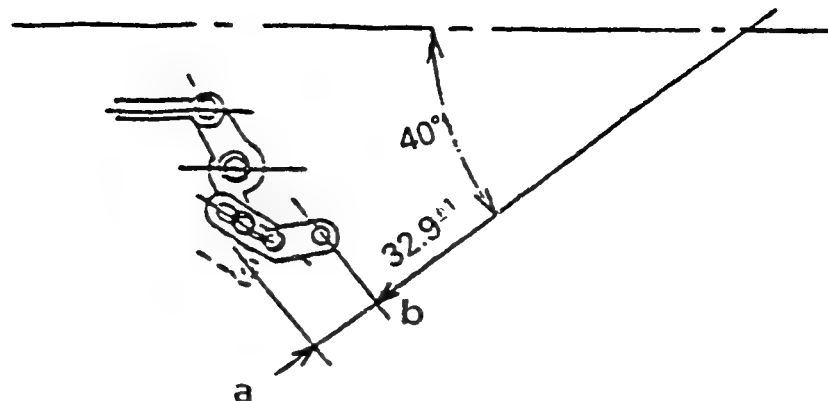


Fig. 23

104740-3831 4/4

a = Full-speed

b = Idling

■ A/T LINK LEVER ADJUSTMENT

1. Move the control lever from the idling position to the full speed position and confirm that the A/T lever stroke (L) is

$32.9 \pm 1 \text{ mm.}$

2. If dimension L is not as specified, loosen the bolt and adjust by altering the A/T lever position.
3. After adjustment, securely tighten the bolt.



Test oil		ZEXEL-TEST VALUES					1/2	
ISO 4113 od		Distributor pumps					BOSCH No. 9 460 610 432	
SAE J967d		Engine model: 4D56					ZEXEL No. 104740-3881	
							Date: 25.6.1990 [2]	
							Company: MITSUBISHI	
							No. MD147939	
Injection pump no.:104640-3881		(NP-VE4/10F2000RNP825)						
Pump rot.: clockwise-viewed from drive side		Test-nozzle holder combination:					Test pressure line:	
Prestroke setting: mm		1 688 901 000					1 680 750 017	
1. Setting values		Speed (rpm)	Setting values			Charge-air pressure bar (mmHg)	Difference (cc)	
1-1	Timing device travel	1250	4.3 - 4.7 (mm)				3.0	
1-2	Supply pump pressure	1250	4.5 - 5.1 (kg/cm²)					
1-3	Full load deliv. without charge air pr. Full load deliv. with charge air press.	1250	45.3 - 46.3 (cc/1000st)					
1-4	Idle speed regulation	375	8.5 - 11.5 (cc/1000st)				2.0	
1-5	Start	100	63.0 - 83.0 (cc/1000st)					
1-6	Full-load speed regulation	2150	15.1 - 21.1 (cc/1000st)					
1-7	Load-timer adjustment	1250	T=0.6 ± 0.2 (mm)				4.0	
1-8								
2. Test values								
2-1 Timing device	N = rpm mm	500 1.6-2.4	750 2.4-3.2	1250 4.2-4.8	1750 6.0-7.2	2000 7.1-8.0	3. Dimensions K 3.2 - 3.4 mm KF 5.7 - 5.9 mm MS 1.1 - 1.3 mm BCS - mm Control lever angle α 55 - 63 deg A 10.5 - 16.0 mm β 40 - 50 deg B 12.1 - 16.1 mm γ - deg C - mm	
2-2 Supply pump	N = rpm kg/cm²			1250 4.5-5.1	2000 6.3-6.9			
2-3 Overflow delivery	N = rpm cc/10s			1250 48 - 92				
2-4 Fuel injection quantities								
Speed control lever pos.	Speed (rpm)	Fuel delivery (cc/1000st)		Charge-air pres (mmHg)	Difference (cc)			
End stop	600	42.3 - 46.3						
	1250	44.8 - 46.8						
	1750	38.2 - 42.2						
	2000	37.1 - 41.3						
	2150	14.6 - 21.6						
	2500	below 5.0						
Switch off	375	0						
Idle-stop	375	8.5 - 11.5						
	600	below 5.0						
	750	below 3.0						
2-5 Solenoid	Cut-in voltage max. 8 V Test voltage: 12 - 14 V							

E12

ZEXEL - Test values
Injection pumps

E13

ZEXEL - Test values
Injection pumps

LOAD TIMER ADJUSTMENT

1. Adjustment

1) Fix the control lever in the position satisfying the following conditions:

Boost Pressure: - mmHg
 Pump Speed : 1250 rpm
 Fuel Injection
 Quantity : 35.5 ± 0.5 cc/1000st

2) With the control lever positioned as described in 1) above, adjust the governor sleeve so that the Timer Stroke conforms to the specified values.

2. Confirmation of Timer Characteristics

Fix the control lever in the position satisfying the following conditions, and confirm the Timer Stroke.

Control lever position			Specified values	
Pump speed (rpm)	Fuel injection quantity (cc/1000st)	Boost pressure (mmHg)	Timer stroke (mm)	Timer stroke reduction value (mm)
1250	34.5 - 36.5	-		0.3 - 0.9
1250	26.5 - 29.5	-		0.9 - 1.9

E14

ZEXEL - Test values
 Injection pumps



E15

ZEXEL - Test values
 Injection pumps



Test oil		ZEXEL-TEST VALUES					1/2																						
ISO 4113 od		Distributor pumps					BOSCH No. 9 460 610 435																						
SAE J967d		Engine model: 4D56					ZEXEL No. 104740-3990																						
							Date: 25.6.1990 [0]																						
							Company: MITSUBISHI																						
							No. MD155267																						
Injection pump no.:104640-3990		(NP-VE4/10F2100RNP824)																											
Pump rot.: clockwise viewed from drive side		Test-nozzle holder combination:					Test pressure line:																						
Prestroke setting: mm		1 688 901 000					1 680 750 017																						
1. Setting values		Speed (rpm)	Setting values			Charge-air pressure bar (mmHg)	Difference (cc)																						
1-1	Timing device travel	1250	4.3 - 4.7 (mm)				3.0																						
1-2	Supply pump pressure	1250	4.5 - 5.1 (kg/cm²)																										
1-3	Full load deliv. without charge air pr. Full load deliv. with charge air press.	1250	45.3 - 46.3 (cc/1000st)																										
1-4	Idle speed regulation	375	8.5 - 11.5 (cc/1000st)				2.0																						
1-5	Start	100	63.0 - 83.0 (cc/1000st)																										
1-6	Full-load speed regulation	2550	15.1 - 21.1 (cc/1000st)																										
1-7	Load-timer adjustment	1250					4.0																						
1-8			T=0.6 ± 0.2 (mm)																										
2. Test values																													
2-1 Timing device	N = rpm mm	500 1.6-2.4	750 2.4-3.2	1250 4.2-4.8	1750 6.0-7.2	2100 7.4-8.2	<div>3. Dimensions</div> <table><tr><td>K</td><td>3.2 - 3.4 mm</td></tr><tr><td>KF</td><td>5.7 - 5.9 mm</td></tr><tr><td>MS</td><td>1.1 - 1.3 mm</td></tr><tr><td>Stroke (timer)</td><td>7.4 - 8.2 mm</td></tr><tr><td colspan="2">Control lever angle</td></tr><tr><td>α</td><td>55 - 63 deg</td></tr><tr><td>A</td><td>mm</td></tr><tr><td>β</td><td>39 - 51 deg</td></tr><tr><td>B</td><td>mm</td></tr><tr><td>γ</td><td>- deg</td></tr><tr><td>C</td><td>- mm</td></tr></table>	K	3.2 - 3.4 mm	KF	5.7 - 5.9 mm	MS	1.1 - 1.3 mm	Stroke (timer)	7.4 - 8.2 mm	Control lever angle		α	55 - 63 deg	A	mm	β	39 - 51 deg	B	mm	γ	- deg	C	- mm
K	3.2 - 3.4 mm																												
KF	5.7 - 5.9 mm																												
MS	1.1 - 1.3 mm																												
Stroke (timer)	7.4 - 8.2 mm																												
Control lever angle																													
α	55 - 63 deg																												
A	mm																												
β	39 - 51 deg																												
B	mm																												
γ	- deg																												
C	- mm																												
2-2 Supply pump	N = rpm kg/cm²			1250 4.5-5.1		2100 6.5-7.1																							
2-3 Overflow delivery	N = rpm cc/10s			1250 48 - 92																									
2-4 Fuel injection quantities																													
Speed control lever pos.	Speed (rpm)	Fuel delivery (cc/1000st)		Charge-air pres (mmHg)	Difference (cc)																								
End stop	600	42.3 - 46.3																											
	1250	44.8 - 46.8																											
	1750	38.2 - 42.2																											
	2100	37.1 - 41.3																											
	2550	14.6 - 21.6																											
	2900	below 5.0																											
Switch off	375	0																											
Idle-stop	375	8.5 - 11.5																											
	600	below 5.0																											
	750	below 3.0																											
2-5 Solenoid	Cut-in voltage max. 8 V Test voltage: 12 - 14 V																												

E16

ZEXEL - Test values
Injection pumps



E17

ZEXEL - Test values
Injection pumps



LOAD TIMER ADJUSTMENT

1. Adjustment

- 1) Fix the control lever in the position satisfying the following conditions:

Boost Pressure: - mmHg
 Pump Speed : 1250 rpm
 Fuel Injection
 Quantity : 35.5 ± 0.5 cc/1000st

- 2) With the control lever positioned as described in 1) above, adjust the governor sleeve so that the Timer Stroke conforms to the specified values.

2. Confirmation of Timer Characteristics

Fix the control lever in the position satisfying the following conditions, and confirm the Timer Stroke.

Control lever position			Specified values	
Pump speed (rpm)	Fuel injection quantity (cc/1000st)	Boost pressure (mmHg)	Timer stroke (mm)	Timer stroke reduction value (mm)
1250	34.5 - 36.5	-		0.3 - 0.9
1250	26.5 - 29.5	-		0.9 - 1.9

FICD MOUNTING POSITION ADJUSTMENT

- Hold the control lever in the idling position.
- Position the FICD mounting bracket so that the gap between the control lever and the FICD lever is 1 ± 1 mm.

E18

ZEXEL - Test values
 Injection pumps



E19

ZEXEL - Test values
 Injection pumps



Test oil:
ISO 4113 od
SAE J967d

ZEXEL-TEST VALUES
Distributors pumps
Engine model:SD25

BOSCH No. 9 460 610 412
ZEXEL No. 104740-4734
Date: 25.6.1990 [4]
Company: NISSAN DIESEL
No. 1670010H04

Injection pump no. 104640-4733 (NP-VE4/10F1200RNP371)

Pump rot.: clockwise-viewed form drive side

Prestroke setting: 0.26 - 0.30 mm

Test-nozzle holder combination:
1 688 901 000

Test pressure line:
1 680 750 017

1. Setting values		Speed (rpm)	Setting values	Charge-air pressure bar (mmHg)	Difference (cc)
1-1	Timing device travel	900	1.7 - 2.1 (mm)		
1-2	Supply pump pressure	900	4.1 - 4.5 (kg/cm ²)		
1-3	Full load deliv. without charge-air pr. Full load deliv. with charge-air pres.	900	36.7 - 37.7 (cc/1000st) (cc/1000st)		3.5
1-4	Idle speed regulation	350	8.0 - 12.0 (cc/1000st)		3.0
1-5	Start	100	45.0 - 80.0 (cc/1000st)		
1-6	Full-load speed regulation	1400	9.1 - 15.1 (cc/1000st)		3.5
1-7	Load-timer adjustment				
1-8					

2. Test values

2-1 Timing device	N = rpm mm	900 1.6 - 2.2	1200 2.7 - 3.9	1450 3.5 - 4.7
2-2 Supply pump	N = rpm kg/cm ²	900 4.0 - 4.6	1200 4.8 - 5.4	
2-3 Overflow delivery	N = rpm cc/10s	900 42.0 - 85.0		

2-4 Fuel injection quantities

Control lever position	Speed rpm	Fuel delivery (cc/1000 strokes)	Charge-air pres(mmHg)	Difference (cc)
End stop	600	33.2 - 37.2		
	900	36.2 - 38.2		
	1200	38.0 - 42.2		
	1400	8.6 - 15.6		
	1500	below 3.0		
Switch off	350	0		
Idle	350	8.0 - 12.0		
stop	400	below 3.0		

2-5 Solenoid Cut-in voltage max. 8 V
Test voltage: 12 - 14 V

3. Dimensions

K	3.2 - 3.4 mm
KF	5.7 - 5.9 mm
MS	0.9 - 1.1 mm
BCS	- mm

Control lever angle

α	21.0 - 29.0 deg
A	4.0 - 9.2 mm
β	37.0 - 47.0 deg
B	10.7 - 14.8 mm
γ	- deg
C	- mm

E20

ZEXEL - Test values
Injection pumps



E21

ZEXEL - Test values
Injection pumps



Test oil
ISO 4113 od
SAE J967d

ZEXEL-TEST VALUES
Distributor pumps
Engine model:TD25

1/3

BOSCH No. 9 460 610 430
ZEXEL No. 104740-7260
Date: 25.6.1990 [0]
Company: NISSAN DIESEL
No. 16700 21T13

Injection pump no.: 104640-7260

(NP-VE4/10F2150RNP806)

Pump rotation: clockwise viewed from
drive side

Test-nozzle holder combination:
1 688 901 000

Test pressure line:
1 680 750 017

1. Setting values		Speed (rpm)	Setting values	Charge-air pressure bar (mmHg)	Difference (cc)
1-1	Timing device travel	1100	S/T ON 3.9 - 4.7 (mm) OFF 2.4 - 2.8 (kg/cm ²)	*) S/T = Solenoid timer	3.0
1-2	Supply pump pressure	1100	S/T ON 4.5 - 5.3 (mm) OFF 3.5 - 4.1 (kg/cm ²)		
1-3	Full load deliv. without charge air pre Full load deliv. with charge air press.	1100	48.0 - 49.0 (cc/1000st) (cc/1000st)		
1-4	Idle speed regulation	350	4.5 - 8.5 (cc/1000st)		
1-5	Start	100	45.0 - 80.0 (cc/1000st)		
1-6	Full-load speed regulation	2500	10.1 - 14.1 (cc/1000st)		
1-7	Load-timer adjustment	1100	T=1.0 ± 0.2 (mm)		

2. Test values

2-1 Timing device	Solenoid timer	ON		OFF		
	N = rpm mm	1100 3.8-4.8		1100 2.3-2.9	1700 4.3-5.5	2300 6.0-7.0
2-2 Supply pump	N = rpm kg/cm ²	1100 4.5-5.3	1700 5.9-6.7	1100 3.5-4.1	1700 4.9-5.5	2150 5.8-6.4
2-3 Overflow delivery	N = rpm ⁻¹ cc/10s	1100 43.0-87.0	1100 60-103	without O-ring		
2-4 Fuel injection quantities						
Speed control lever pos.	Speed (rpm)	Fuel delivery (cc/1000st)		Charge-air pres (mmHg)	Difference (cc)	
End stop	1100	47.5 - 49.5				
	600	45.1 - 49.1				
	2150	38.5 - 42.7				
	2300	28.3 - 37.3				
	2500	9.6 - 14.6				
	2700	below 5.0				
Switch off	350	0				
Idle- stop	350	4.5 - 8.5				
	450	below 3.0				
2-5 Solenoid	Cut-in voltage max.: 8 V Test voltage: 12 - 14 V					

3. Dimensions

K 3.2 - 3.7 mm
KF 5.7 - 5.9 mm
MS 0.9 - 1.1 mm
BCS - mm
Prestr. - mm

Control lever angle

α 50.0 - 58.0 deg
A 10.7 - 14.2 mm
β 31.0 - 41.0 deg
B 9.3 - 12.9 mm
γ - deg
C - mm

E22

ZEXEL - Test values
Injection pumps



E23

ZEXEL - Test values
Injection pumps



Note

If there is no designation in the specifications for the Solenoid Timer's ON - OFF position, then the position should be regarded as OFF.

LOAD TIMER ADJUSTMENT

1. Adjustment

1) Fix the control lever in the position satisfying the following conditions:

Boost Pressure: - mmHg
 Pump Speed : 1100 rpm
 Fuel Injection
 Quantity : 37.5 - 38.5 cc/1000st

2) With the control lever positioned as described in 1) above, adjust the governor sleeve so that the Timer Stroke conforms to the specified values (1 - 7).

Control lever position			Specified values	
Pump speed (rpm)	Fuel injection quantity (cc/1000st)	Boost pressure (mmHg)	Timer stroke (mm)	Timer stroke reduction value (mm)
1100	37.0 - 39.0	-	-	0.7 - 1.3
1100	28.5 - 31.5	-	-	1.2 - 2.2

E24

ZEXEL - Test values

Injection pumps

**E25**

ZEXEL - Test values

Injection pumps



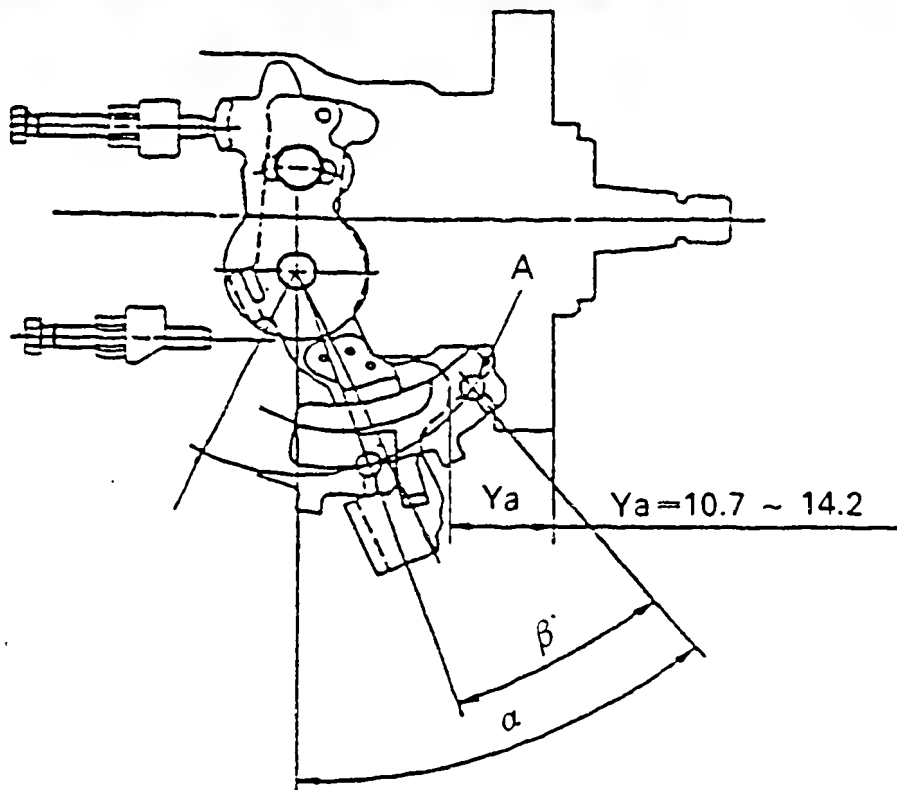


Fig. 24

104740-7260 3/3

■ CONTROL LEVER ANGLE MEASUREMENT POSITION

- 1) Measure the control lever angles (α , β , γ) at hole A.



Test oil		ZEXEL-TEST VALUES				1/2		
ISO 4113 od		Distributor pumps				BOSCH No. 9 460 610 436		
SAE J967d		Engine model:TD23				ZEXEL No. 104740-9811		
						Date: 25.6.1990 [1]		
						Company: NISSAN DIESEL		
						No. 16700 21T08		
Injection pump no.: 104640-9811		(NP-VE4/10F2150RNP694)						
Pump rotation: clockwise viewed from drive side		Test-nozzle holder combination: 1 688 901 000				Test pressure line: 1 680 750 017		
1. Setting values		Speed (rpm)	Setting values			Charge-air pressure bar (mmHg)	Difference (cc)	
1-1	Timing device travel	1100	S/T ON 3.8 - 4.6 (mm) OFF 2.3 - 2.7 (kg/cm ²)			*) S/T = Solenoid timer	3.0	
1-2	Supply pump pressure	1100	S/T ON 4.5 - 5.3 (mm) OFF 3.5 - 4.1 (kg/cm ²)					
1-3	Full load deliv. without charge air pre Full load deliv. with charge air press.	1100	44.1 - 45.1 (cc/1000st) (cc/1000st)					
1-4	Idle speed regulation	350	4.5 - 8.5 (cc/1000st)			2.0		
1-5	Start	100	45.0 - 80.0 (cc/1000st)					
1-6	Full-load speed regulation	2350	28.3 - 32.3 (cc/1000st)					
1-7								
2. Test values								
2-1 Timing device		Solenoid timer N = rpm mm	ON 1100 1700 3.7-4.7 5.4-7.0		OFF 1100 1700 2550 2.2-2.8 4.0-5.2 6.4-7.4		3. Dimensions	
2-2 Supply pump		N = rpm kg/cm ²	1100 1700 4.5-5.3 5.9-6.7		1100 1700 2150 3.5-4.1 4.9-5.5 5.8-6.4			
2-3 Overflow delivery		N = rpm ⁻¹ cc/10s	1100 1100 43.0-87.0 60-103		without O-ring			
2-4 Fuel injection quantities								
Speed control lever pos.		Speed (rpm)	Fuel delivery (cc/1000st)		Charge-air pres (mmHg)	Difference (cc)		
End stop		600	41.5 - 45.5					
		1100	43.6 - 45.6					
		2150	35.9 - 40.1					
		2350	27.8 - 32.8					
		2550	5.4 - 12.4					
		2700	below 5.0					
Switch off		350	0					
Idle-stop		350 450	4.5 - 8.5 below 3.0					
2-5 Solenoid		Cut-in voltage max.: 8 V Test voltage: 12 - 14 V						
3. Dimensions								
K	3.2 - 3.4 mm							
KF	5.7 - 5.9 mm							
MS	0.9 - 1.1 mm							
BCS	- mm							
Prestr.	- mm							
Control lever angle								
α	50.0 - 58.0 deg							
A	10.7 - 14.2 mm							
β	31.0 - 41.0 deg							
B	9.3 - 12.9 mm							
γ	- deg							
C	- mm							

F1

ZEXEL - Test values
Injection pumps



F2

ZEXEL - Test values
Injection pumps



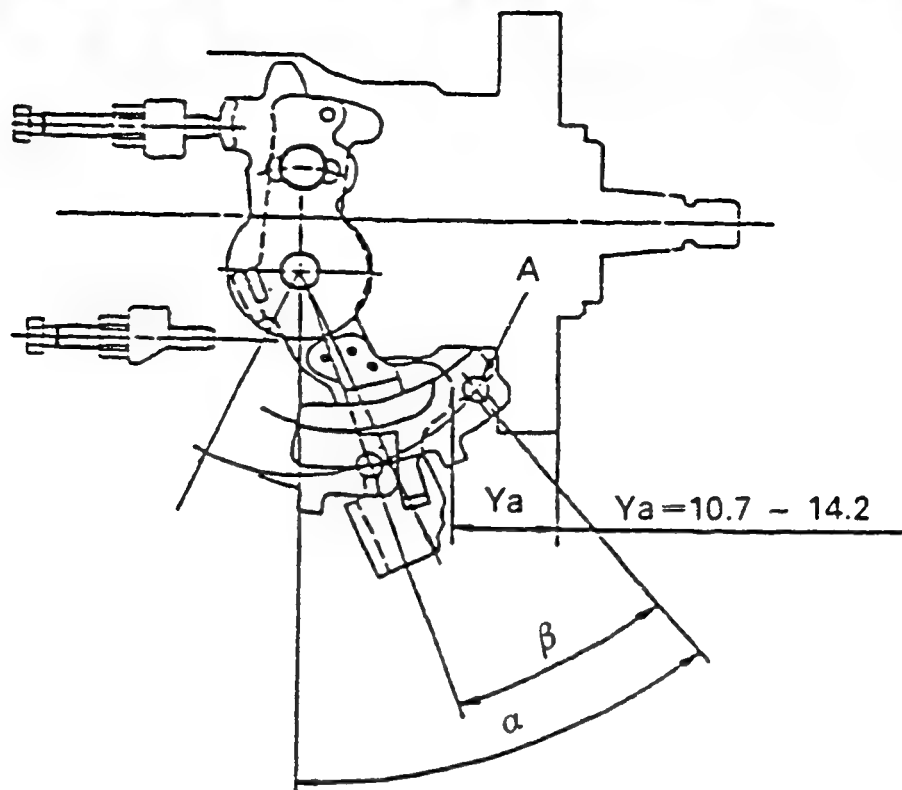


Fig. 25

104740-9811 2/2

Note

■ If there is no designation in the specifications for the Solenoid Timer's ON - OFF position, then the position should be regarded as OFF.

■ Control lever angle measurement position

- 1) Measure the control lever angles (α , β , γ) at hole A.



Test oil:		ZEXEL-TEST VALUES				1/2	
ISO 4113 od		Distributor pumps				BOSCH No. 9 460 610 407	
SAE J967d		Engine model:4JB1-BG				ZEXEL No. 104741-1761	
						Date: 25.6.1990 [1]	
						Company: ISUZU	
						No. 8944710501	
Injection pump no.: 104641-1761		(NP-VE4/11F1900LNP651)					
Pump rotation: Counter clockwise-viewed from drive side		Test-nozzle holder combination: 1 688 901 000		Test pressure line: 1 680 750 017			
1. Setting values		Speed (rpm)	Setting values		Charge-air pressure bar (mmHg)		Difference (cc)
1-1	Time device travel	1450	1.7 - 2.1 (mm)				3.5
1-2	Supply pump pressure	1450	5.0 - 5.4 (kg/cm²)				
1-3	Full load deliv. without charge air pre	1000	44.1 - 45.1 (cc/1000st)				
1-4	Idle speed regulation	390	6.0 - 10.0 (cc/1000st)				
1-5	Start	100	75.0 -115.0 (cc/1000st)		-164 ± 5		2.0
1-6	Full-load speed regulation	2100	17.2 - 23.2 (cc/1000st)				
1-7	ACS adjustment	1000	Decrease 3.6 - 6.2 (cc/1000st)				
2. Test values							
2-1 Timing device		Solenoid timer N = rpm mm	ON 460-660 0.5	1220-1320 0.5	OFF 1450 1.6-2.2	1950 5.3-6.1	3. Dimensions
2-2 Supply pump		N = rpm kg/cm²	1000 3.0-3.6	1450 5.0-5.4	1950 6.5-7.1		
2-3 Overflow delivery		N = rpm cc/10s	1450 63.0-107.0				
2-4 Fuel delivery quantities							
Speed control lever pos.		Speed (rpm)	Fuel delivery (cc/1000st)	Charge-air pres (mmHg)	Difference (cc)		
End stop		1000 500 700 1450 1800 2000 2100 2300	43.6 - 45.6 41.2 - 49.2 38.1 - 43.1 44.7 - 49.7 42.3 - 48.3 32.3 - 41.3 16.7 - 23.7 below 5.0				
Switch off		390	0				
Idle-stop		390 550	6.0 - 10.0 below 3.0				
ACS adjustment		1000	Decrease 2.9-6.9	-164 ± 5			
2-5 Solenoid		Cut-in voltage max.: 8 V Test voltage: 12 - 14 V					
K 2.7 - 2.9 mm							
KF 4.9 - 5.1 mm							
MS 0.9 - 1.1 mm							
BCS - mm							
Prestr. 0.43 - 0.47 mm							
Control lever angle							
α 14.0 - 22.0 deg							
A 2.5 - 7.6 mm							
β 26.0 - 36.0 deg							
B 7.4 - 11.2 mm							
γ - deg							
C - mm							

F4

ZEXEL - Test values
Injection pumps



F5

ZEXEL - Test values
Injection pumps



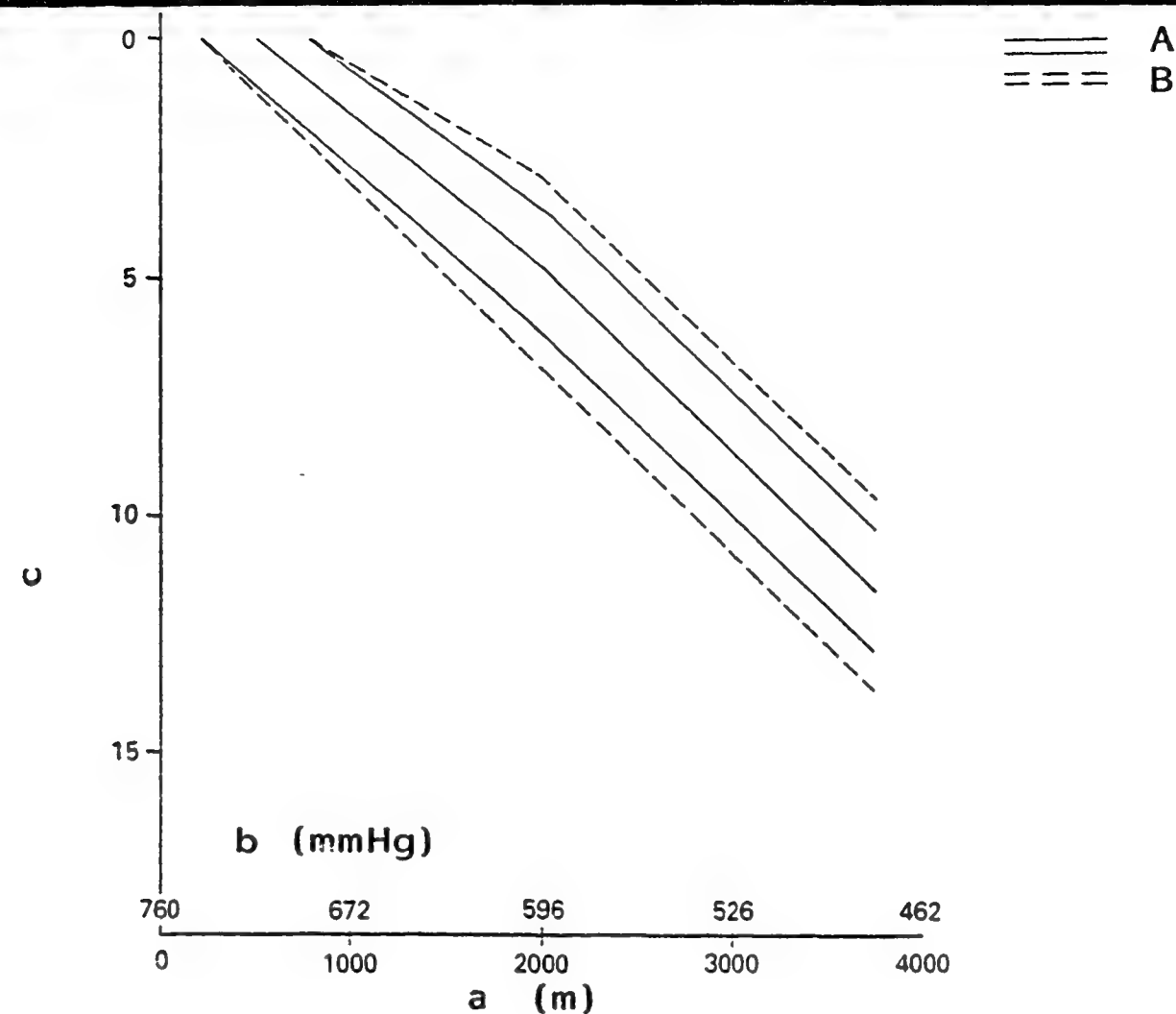


Fig. 26

a = Altitude

b = Atmospheric pressure

c = Injection quantity decrease (cc/1000st)

A = Adjustment value

B = Inspection value

104741-1761 2/2

■ FULL-LOAD FUEL INJECTION QUANTITY AND ACS ADJUSTING PROCEDURE AT HIGH ALTITUDES

1. FULL-LOAD FUEL INJECTION QUANTITY ADJUSTMENT

- 1) Remove the ACS cover, the bellows and the adjusting shims.
- 2) Perform all adjustments as described in the adjusting specifications, except for ACS adjustment.

2. ACS ADJUSTMENT

- 1) Attach the ACS cover, the bellows and the adjusting shims.
- 2) At a pump speed of 1000 rpm and referring to the graph above, use the shims to adjust the fuel injection quantity decrease according to the altitude.

F6

ZEXEL - Test values

Injection pumps



F7

ZEXEL - Test values

Injection pumps



Test oil:		ZEXEL-TEST VALUES				1/4		
ISO 4113 od		Distributor pumps				BOSCH No. 9 460 610 306		
SAE J967d		Engine model:4JB1-TC				ZEXEL No. 104741-6352		
						Date: 25.6.1990 [1]		
						Company: ISUZU		
						No. 8943268703		
Injection pump no.: 104641-6352		(NP-VE4/11F1900RNP773)						
Pump rotation: clockwise-viewed from drive side		Test-nozzle holder combination: 1 688 901 000				Test pressure line: 1 680 750 017		
1. Setting values		Speed (rpm)	Setting values		Charge-air pressure bar (mmHg)	Difference (cc)		
1-1	Time device travel	1500	4.9 - 5.3 (mm)		590 - 610			
1-2	Supply pump pressure	1500	4.7 - 5.1 (kg/cm²)		590 - 610			
1-3	Full load deliv. without charge air pre	1250	68.1 - 69.1 (cc/1000st)		590 - 610	3.5		
	Full load deliv. with charge air press.	800	47.7 - 48.7 (cc/1000st)		295 - 315	4.5		
1-4	Idle speed regulation	385	6.1 - 10.1 (cc/1000st)		0	2.0		
1-5	Start	100	80.0 - 90.0 (cc/1000st)		0			
1-6	Full-load speed regulation	2300	16.6 - 22.6 (cc/1000st)		590 - 610	4.5		
2. Test values								
2-1 Timing device		Solenoid timer N = rpm mm	ON 750 above 1.0	1500 4.9-5.3	OFF 1700 6.7-7.5	1900 8.3-9.0		
2-2 Supply pump		N = rpm kg/cm²		1500 4.7-5.1		1900 5.8-6.4		
2-3 Overflow delivery		N = rpm cc/10s	1500 57.0 - 100.0	1500 65 - 108				
2-4 Fuel delivery quantities								
Speed control lever pos.		Speed (rpm)	Fuel delivery (cc/1000st)	Charge-air pres (mmHg)	Difference (cc)			
End stop		400	36.5 - 47.5	0				
		600	34.7 - 40.7	130 - 150				
		800	47.2 - 49.2	295 - 315				
		1250	67.6 - 69.6	590 - 610				
		1250	47.6 - 54.6	0				
		1900	66.5 - 75.5	590 - 610				
		2300	16.1 - 23.1	590 - 610				
		2400	below 12	590 - 610				
Switch off		385	0	0				
Idle-stop		385	6.1 - 10.1	0				
		500	below 3.0	0				
2-5 Solenoid		Cut-in voltage max.: 8 V Test voltage: 12 - 14 V						

3. Dimensions	
K	2.7 - 2.9 mm
KF	5.4 - 5.6 mm
MS	0.9 - 1.1 mm
BCS	3.8 - 4.0 mm
Prestr.	0.73 - 0.77 mm
Control lever angle	
α	20.0 - 28.0 deg
A	- mm
β	43.0 - 53.0 deg
B	- mm
γ	- deg
C	- mm

F8

ZEXEL - Test values
Injection pumps



F9

ZEXEL - Test values
Injection pumps



POTENTIOMETER ADJUSTMENT SPECIFICATIONS

Pump speed (rpm)	Output voltage (V)	Injection quantity mm ³ /st	Remarks
750	2.49 \pm 0.03	8.7 \pm 1 Boost = 600 mmHg	Adjustment point
385	0.96 \pm 0.4	8.1 \pm 2 (idle)	Confirmation point

Adjustment (voltage: 10V, dummy bolt method)

1. At a pump speed of 750 rpm and a fuel injection quantity of 8.7 \pm 1 mm³/st, adjust the dummy bolt so that it contacts the control lever, and then fix it using the locknut.
2. Then, adjust the potentiometer so that the output voltage is 2.49 \pm 0.03 v.
3. Following adjustment, remove the dummy bolt and confirm that the potentiometer output voltage is as specified above when the control lever is in the idle position.

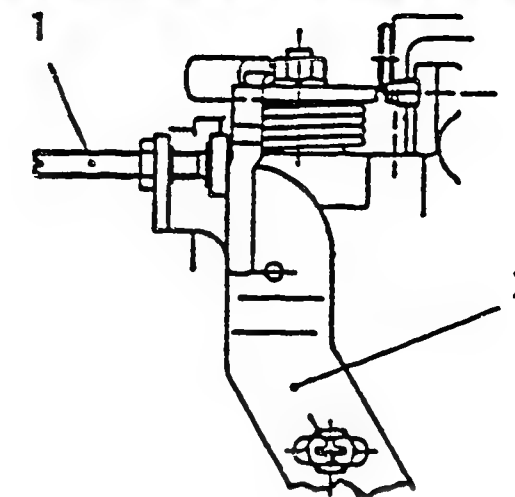


Fig. 27

- 1 = Dummy bolt
2 = Dummy bolt installation bracket

F10

ZEXEL - Test values
Injection pumps



F11

ZEXEL - Test values
Injection pumps



■ MICROSWITCH ADJUSTMENT

Injection quantity specifications (Boost pressure = 600 mmHg)		Microswitch adjustment specifications	
Speed (rpm)	Injection quantity (mm ³ /st)	Microswitch operation	Potentiometer output (V)
1000	29.1 ± 3.5	ON → OFF	3.89 ± 0.05

1. Fix the dummy bolt used to adjust the potentiometer so that potentiometer output voltage is 3.89 V.
2. Move the microswitch in the direction of the arrow from the ON position of the OFF position, and fix it in this position.
3. Loosen the dummy bolt and confirm that potentiometer output voltage is 3.89 ± 0.05 when the microswitch moves from ON to OFF.
4. Following adjustment, remove the dummy bolt's fixing bracket.

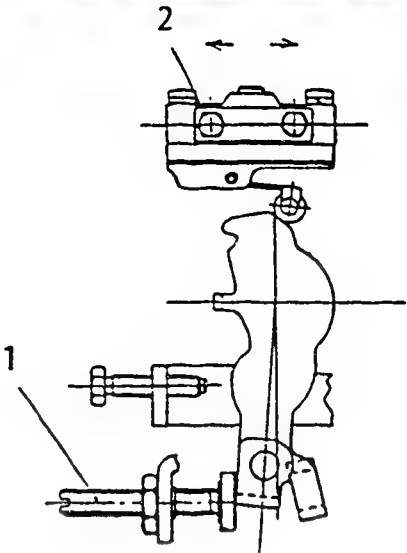


Fig. 28

1 = Dummy bolt
2 = Microswitch fixing bolt
T = 0.2 - 0.3 kgm

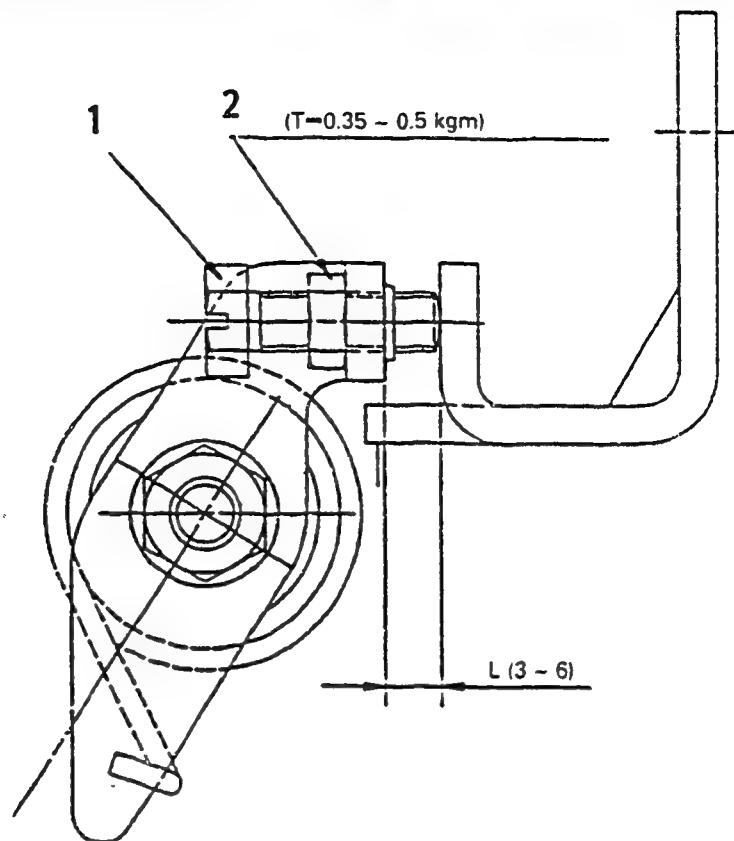


Fig. 29

104741-6352 4/4

- 1 = Bolt
2 = Nut

■ V-FICD ADJUSTMENT

1. Adjust the bracket so that the clearance S is 1^{+1} mm.
2. Apply 400 mmHg negative pressure to the inside of the actuator and confirm that the actuator shaft moves the full stroke.

■ STARTING INJECTION QUANTITY ADJUSTMENT



Test oil:		ZEXEL-TEST VALUES				1/2	
ISO 4113 od		Distributor pumps				BOSCH No. 9 460 610 375	
SAE J967d		Engine model: 4JB1				ZEXEL No. 104741-6541	
						Date: 25.6.1990 [1]	
						Company: ISUZU	
						No. 8943738550	
Injection pump no : 104641-6540		(NP-VE4/11F1800RNP833)					
Pump rotation: clockwise-viewed from drive side		Test-nozzle holder combination: 1 688 901 000				Test pressure line: 1 680 750 017	
1. Test values		Speed (rpm)	Setting values			Charge-air pressure bar (mmHg)	Difference (cc)
1-1	Timing device travel	1500	4.1 - 4.5 (mm)				3.5
1-2	Supply pump pressure	1500	4.4 - 4.8 (kg/cm²)				
1-3	Full load deliv. without charge air pre Full load deliv. with charge air press.	1000	45.2 - 46.2 (cc/1000st) (cc/1000st)				
1-4	Idle speed regulation	385	9.4 - 13.4 (cc/1000st)				2.0
1-5	Start	100	60.0 - 100.0(cc/1000st)				
1-6	Full-load speed regulation	2100	18.4 - 24.4 (cc/1000st)				4.0
2. Test values							
2-1 Timing device		Solenoid timer N = rpm mm	ON	OFF			
			800 above 0.5	1250 0.5-1.3	1500 4.0-4.6	1700 6.2-7.4	1900 7.4-8.2
2-2 Supply pump		N = rpm kg/cm²			1500 4.4-4.8	1700 5.0-5.6	1900 5.7-6.3
2-3 Overflow delivery		N = rpm cc/10s	1500 45.0-98.0		1500 45.0-98.0		
2-4 Fuel injection quantities							
Speed control lever pos.		Speed (rpm)	Fuel delivery (cc/1000st)	Charge-air pres(mmHg)	Difference (cc)		
End stop		650	(30.4 - 38.4)				
		1000	44.7 - 46.7				
		1800	(50.7 - 58.7)				
		2100	17.9 - 24.9				
		2200	below 5.0				
Switch off		385	0				
Idle		550	below 5.0				
stop		385	9.4 - 13.4				
2-5 Solenoid		Cut-in voltage max.: 8 V Test voltage: 12 - 14 V					

3. Dimensions	
K	2.7 - 2.9 mm
KF	4.9 - 5.1 mm
MS	0.9 - 1.1 mm
BCS	- mm
Prestr.	0.43 - 0.47 mm
Control lever angle	
α	14.0 - 22.0 deg
A	2.5 - 7.6 mm
β	26.0 - 36.0 deg
B	7.4 - 11.2 mm
γ	- deg
C	- mm

F15

ZEXEL - Test values
Injection pumps



F16

ZEXEL - Test values
Injection pumps



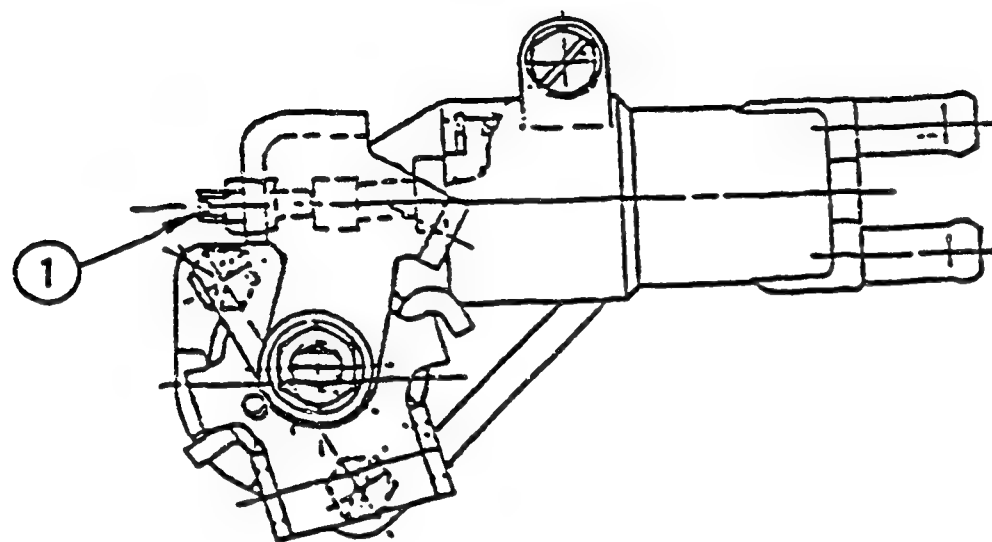


Fig. 30

1 = Screw

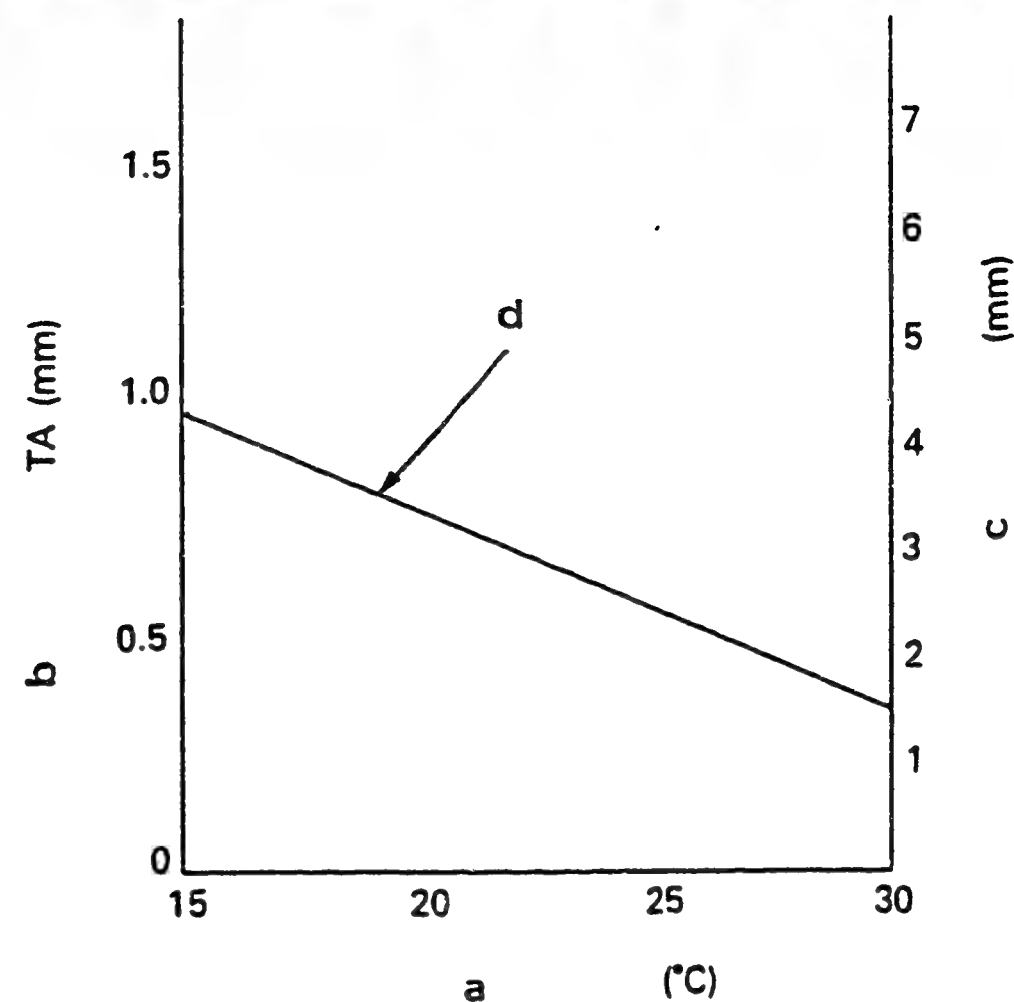


Fig. 31

a = Temperature T

b = Timer stroke

c = Control lever angle (deg/mm)

d = Timer stroke (mm): $TA = -0.0437 t + 1.59$

104741-6541 2/2

W-CSD ADJUSTMENT

1. Timer stroke adjustment

- 1) Calculate the timer stroke from Fig. 31 according to the atmospheric temperature at the time of adjustment. Adjust using timer stroke adjusting screw (1) so that the timer stroke is as calculated in Fig. 31.

F17

ZEXEL - Test values
Injection pumps



F18

ZEXEL - Test values
Injection pumps



Test oil:
ISO 4113 od
SAE J967d

ZEXEL-TEST VALUES
Distributors pumps
Engine model: CD17

1/5

BOSCH No. 9 460 610 273
ZEXEL No. 104748-2180
Date: 25.6.1990
Company: NISSAN
No. 16700 17A01

Injection pump no. 104648-2100

(NP-VE4/8F2500LNP177)

Pump rotation: Counter clockwise-viewed from drive side
Test-nozzle holder combination:
1 688 901 000

Test pressure line:
1 680 750 017

1. Setting values		Speed (rpm)	Setting values	Charge-air pressure bar (mmHg)	Difference (cc)
1-1	Timing device travel	1200	2.3 - 2.9 (mm)		
1-2	Supply pump pressure	1200	3.1 - 3.7 (kg/cm ²)		
1-3	Full load deliv. without charge-air pr.	1200	28.6 - 29.6 (cc/1000st)		2.5
	Full load deliv. with charge-air pres.		(cc/1000st)		
1-4	Idle speed regulation	400	5.3 - 8.3 (cc/1000st)		3.0
1-5	Start	100	45.3 - 55.3 (cc/1000st)		
1-6	Full-load speed regulation	2700	11.9 - 17.9 (cc/1000st)		
1-7	Load-timer adjustment				
1-8					

2. Test values

2-1 Timing device	N = rpm	1200	1800	2500
	mm	2.2 - 3.0	4.3 - 5.5	7.4 - 8.6
2-2 Supply pump	N = rpm	1200	1800	2500
	kg/cm ²	3.0 - 3.8	4.4 - 5.2	6.1 - 6.9
2-3 Overflow delivery	N = rpm	1200		
	cc/10s	36.0 - 80.0		

2-4 Fuel injection quantities

Control lever position	Speed rpm	Fuel delivery (cc/1000 strokes)	Charge-air pres(mmHg)	Difference (cc)
End stop	600	24.3 - 28.3		
	1200	decrease 1.1-4.1	-140 ± 5	
	1200	28.1 - 30.1		
	2500	25.7 - 29.7		
	2700	11.4 - 18.4		
	2900	below 6.0		
Switch off	400	0		
Idle	400	4.8 - 8.8		
stop	600	below 3.0		
Partial load	700	10.0 - 20.0		

2-5
Solenoid
Cut-in voltage max. 8 V
Test voltage: 12 - 14 V

3. Dimensions

K	3.2 - 3.4 mm
KF	5.7 - 5.9 mm
MS	1.1 - 1.9 mm
BCS	- mm
Pre-str.	- mm

Control lever angle

α	20.0 - 28.0 deg
A	3.2 - 8.3 mm
β	39.0 - 49.0 deg
B	11.5 - 15.5 mm
γ	11.3°- 14.5°deg
C	8.7 - 9.3 mm

F19

ZEXEL - Test values
Injection pumps



F20

ZEXEL - Test values
Injection pumps



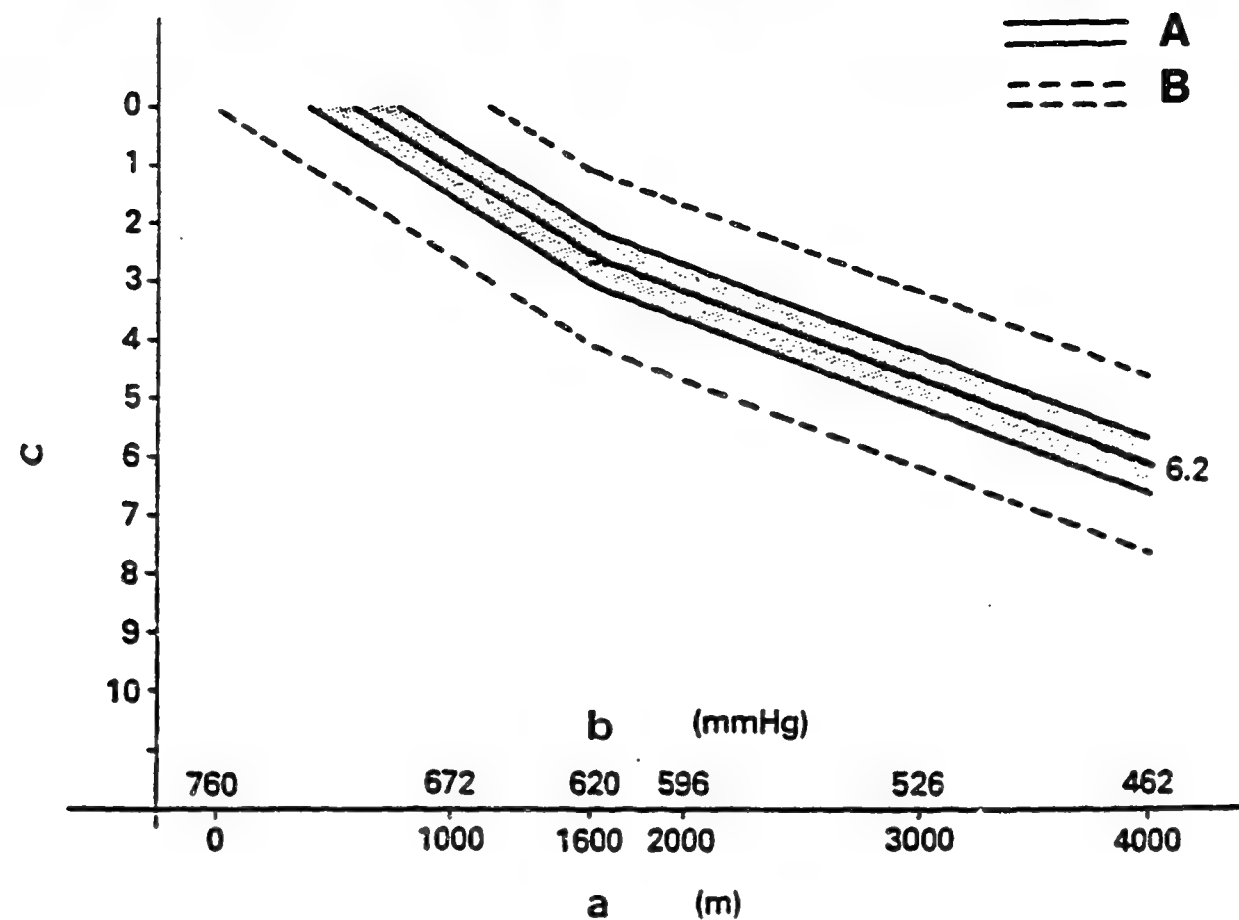


Fig. 32

a = Altitude

b = Atmospheric pressure

c = Injection quantity decrease (cc/1000st)

A = Adjustment value

B = Inspection value

104748-2180 2/5

■ FULL-LOAD FUEL INJECTION QUANTITY AND ACS ADJUSTING PROCEDURE AT HIGH ALTITUDES

1. FULL-LOAD FUEL INJECTION QUANTITY ADJUSTMENT

- 1) Remove the ACS cover, the bellows and the adjusting shims.
- 2) Perform all adjustments as described in the adjusting specifications, except for ACS adjustment.

2. ACS ADJUSTMENT

- 1) Attach the ACS cover, the bellows and the adjusting shims.
- 2) At a pump speed of 1200 rpm and referring to the graph above, use the shims to adjust the fuel injection quantity decrease according to the altitude.

F21

ZEXEL - Test values

Injection pumps



F22

ZEXEL - Test values

Injection pumps



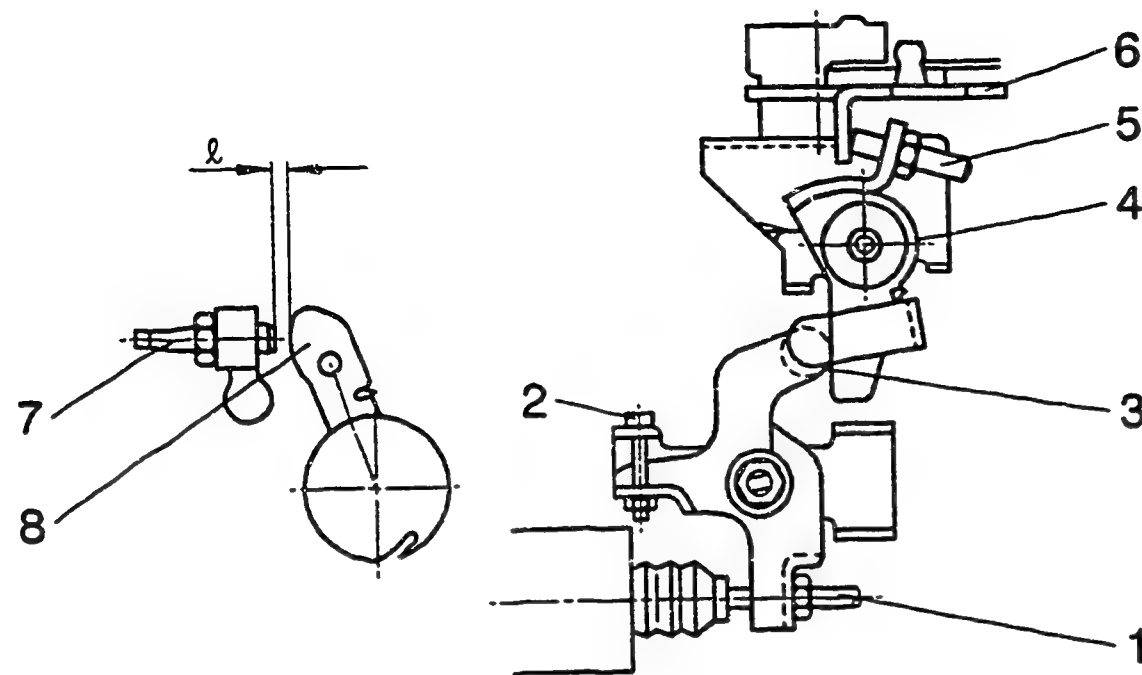


Fig. 33

7 = Idling adjusting bolt
8 = Control lever

Fig. 34

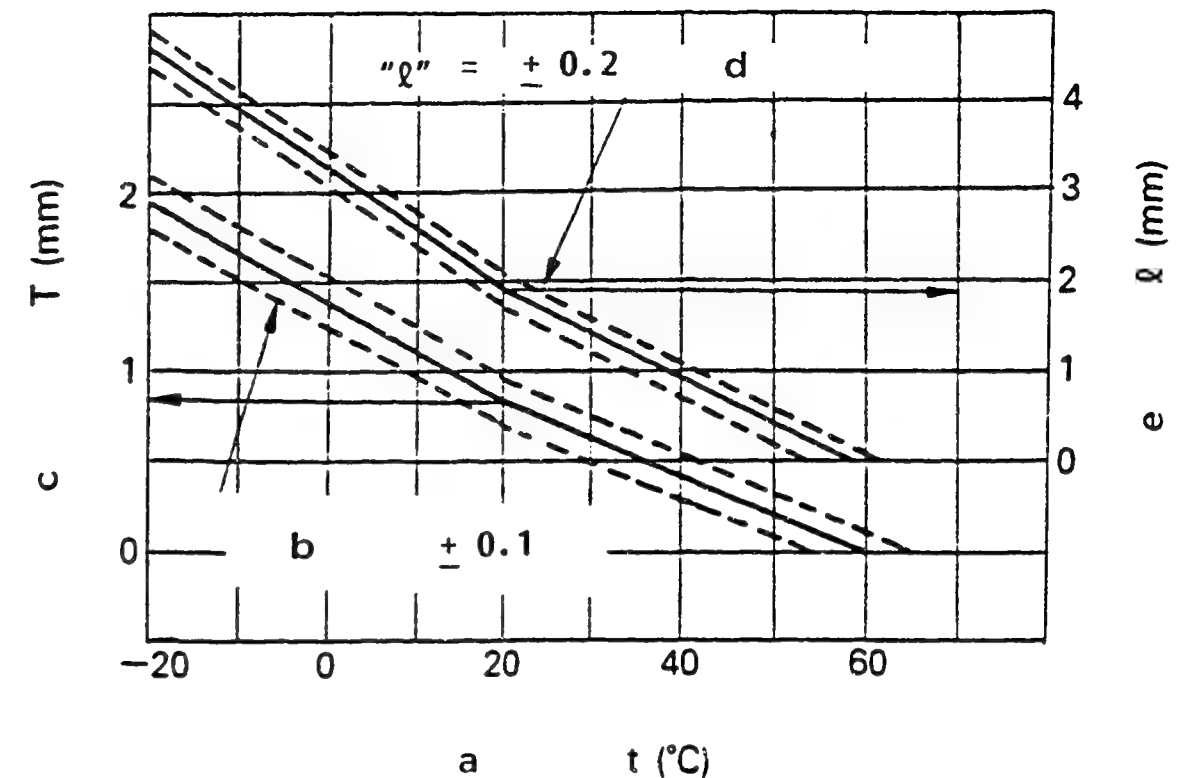


Fig. 35

104748-2180 3/5

- a = Atmospheric temperature
- b = Tolerance of timer lift
- c = Timer stroke
- d = Tolerance of size
- e = Gap between control lever and idling stopper bolt

W-CSD ADJUSTMENT

1. Timer stroke adjustment (Fig. 34)

- 1) Calculate the timer stroke from Fig. 35 according to the atmospheric temperature at the time of adjustment. Adjust using timer stroke adjusting screw (1) so that the timer stroke is as calculated in Fig. 35).



Formula for calculating (Fig. 35)

Formula for calculating timer stroke:

$$\begin{array}{ll} -10 \leq t \leq 20 & T = -0.0284 t + 1.367 \\ 20 \leq t \leq 60 & T = -0.02 t + 1.2 \end{array}$$

Formula for calculating control lever
and idling stopper bolt gap:

$$\begin{array}{ll} -10 < t \leq 20 & l = -0.0667 t + 3.23 \\ 20 < t \leq 60 & l = -0.05 t + 2.9 \end{array}$$

2. Adjustment of intermediate lever position (see Figs. 33 and 34)

104748-2180 4/5

Insert a thickness gauge $l = 1.0 \pm 0.05$ mm between the idling adjusting bolt (7) and the control lever (6). When the upper edge of the intermediate lever roller (4) is aligned with the top edge of the bracket (8), screw in the intermediate lever screw (5) so that it touches the intermediate lever (6).

Next, turn this screw a half to a full rotation clockwise. Turn it back to its previous position, and then tighten.
(During this process, the intermediate lever moves in the horizontal plane by 1° to 3° clockwise.)

3. Adjustment of CSD lever (see Figs. 33 and 34)

Insert the thickness gauge $l = \pm 0.05$ mm, as shown in the diagram (Fig. 35), between the idling adjusting bolt (7) and the control lever (6), and tighten the idling stopper bolt (2) at the point where the roller of the CSD lever (3) touches the intermediate lever (4).

(The temperature of the wax should be below 30°C during adjustment.)

Note :

When inserting the thickness gauge between levers (3) and (4), use the idling stopper bolt (2) to create a gap between them so that they are not subject to excessive force.

■ ADJUSTMENT OF STARTING INJECTION QUANTITY

Adjust the starting injection quantity (item 1-5) using the adjusting bolt.

■ POTENTIOMETER

At a speed of 1100 rpm, an oil temperature of 48 to 52°C and the control lever positioned 14° (6.9 mm) from idling, set the potentiometer in such a way that the values specified in Figs. 36, 37 and 38 are obtained.



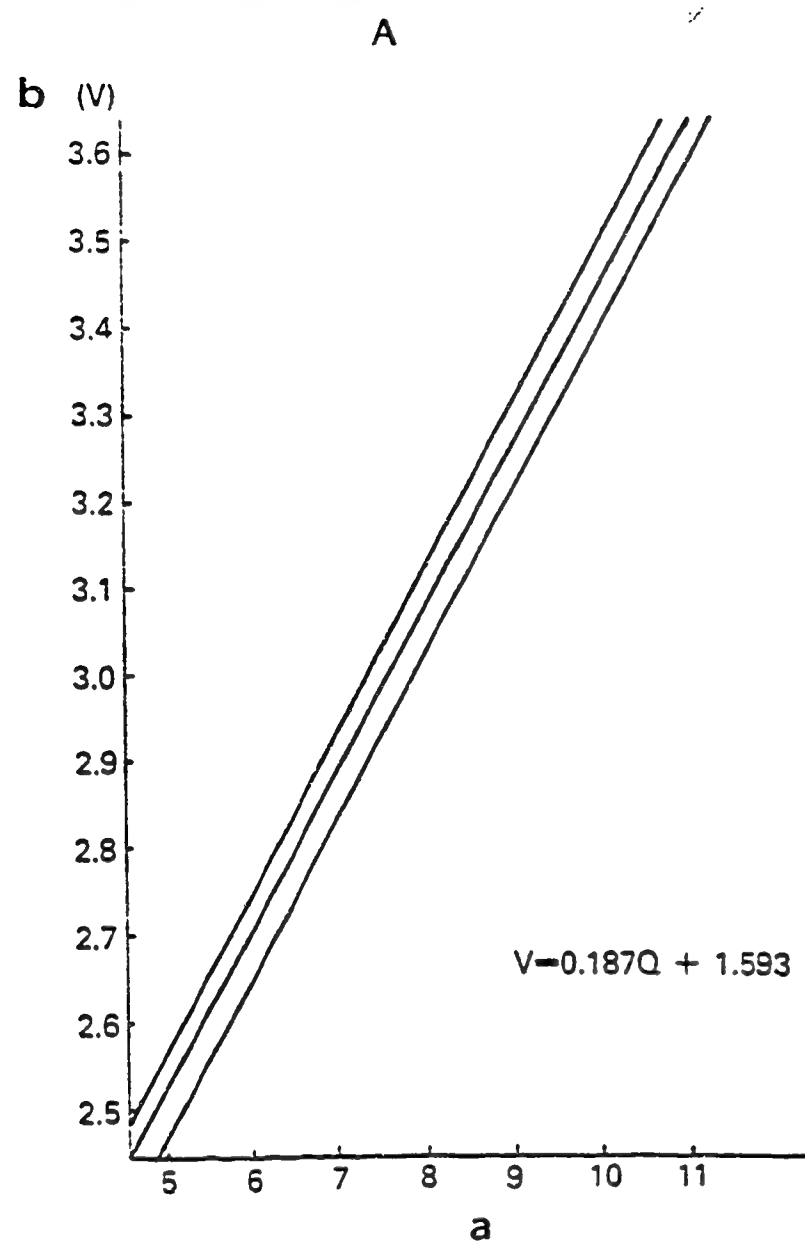


Fig. 36

A = Potentiometer adjusting value (I)

a = Fuel quality (cc/1000st)

b = Voltage

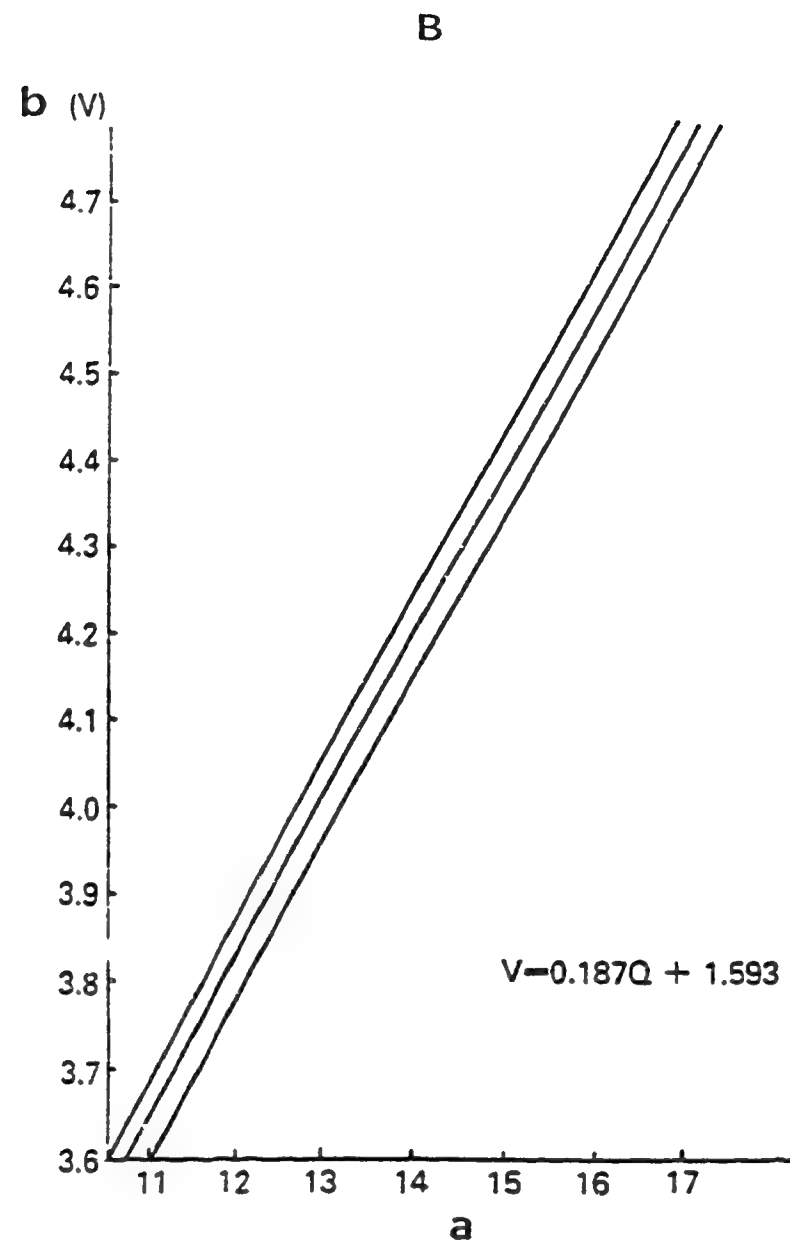


Fig. 37

B = Potentiometer adjusting value (II)

a = Fuel quality (cc/1000st)

b = Voltage

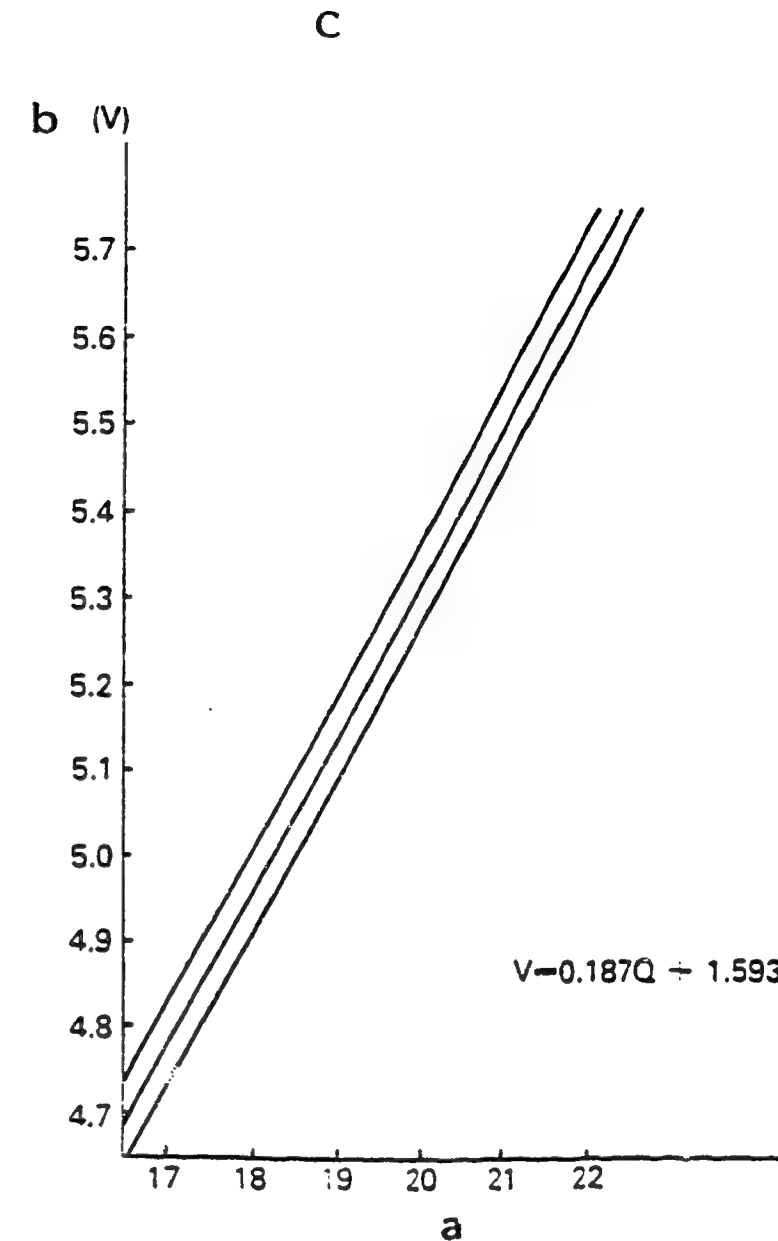


Fig. 38

C = Potentiometer adjusting value (III)

a = Fuel quality (cc/1000st)

b = Voltage

104748-2180 5/5



Test oil:
ISO 4113 od
SAE J967d

ZEXEL-TEST VALUES
Distributors pumps
Engine model: CD17

1/4
BOSCH No. 9 460 610 437
ZEXEL No. 104748-2640
Date: 25.6.1990 [0]
Company: NISSAN
No. 16700 54A11

Injection pump no. 104648-2630

(NP-VE4/8F2500LNP715)

Pump rotation: Counter clockwise-viewed from drive side
Test-nozzle holder combination:
1 688 901 000

Test pressure line:
1 680 750 017

1. Setting values	Speed (rpm)	Setting values	Charge-air pressure bar (mmHg)	Difference (cc)
1-1 Timing device travel	1200	1.5 - 2.1 (mm)		
1-2 Supply pump pressure	1200	3.1 - 3.7 (kg/cm ²)		
1-3 Full load deliv. without charge-air pr. Full load deliv. with charge-air pres.	1000	27.1 - 28.1 (cc/1000st) (cc/1000st)		2.5
1-4 Idle speed regulation	360	3.7 - 6.7 (cc/1000st)		
1-5 Start	100	50.3 - 70.3 (cc/1000st)		
1-6 Full-load speed regulation	2700	11.8 - 17.8 (cc/1000st)		
1-7 Load-timer adjustment				
1-8				

2. Test values

2-1 Timing device	N = rpm mm	1200 1.4 - 2.2	1800 3.5 - 4.7	2500 6.9 - 7.8
2-2 Supply pump	N = rpm kg/cm ²	1200 3.0 - 3.8	1800 4.4 - 5.2	2500 6.1 - 6.9
2-3 Overflow delivery	N = rpm cc/10s	1200 36.0 - 80.0		

2-4 Fuel injection quantities

Control lever position	Speed rpm	Fuel delivery (cc/1000 strokes)	Charge-air pres (mmHg)	Difference (cc)
End stop	1000 600 2500 2700 2900	26.6 - 28.6 24.8 - 28.8 24.3 - 28.3 11.3 - 18.3 below 6.0		
Switch off	360	0		
Idle	360	3.2 - 7.2		2.5
stop	600	below 3.0		
Partial load	700	10.8 - 19.8		

2-5 Solenoid
Cut-in voltage max. 8 V
Test voltage: 12 - 14 V

3. Dimensions

K	3.2 - 3.4 mm
KF	5.7 - 5.9 mm
MS	1.7 - 1.9 mm
BCS	- mm
Pre-str.	- mm

Control lever angle

α	1.0 - -1.0 deg
YA	15.4 - 18.1 mm
β	39.0 - 49.0°deg
B	11.0 - 16.0 mm
γ	13.5°- 14.5°deg
C	8.6 - 9.2 mm

G1

ZEXEL - Test values
Injection pumps



G2

ZEXEL - Test values
Injection pumps



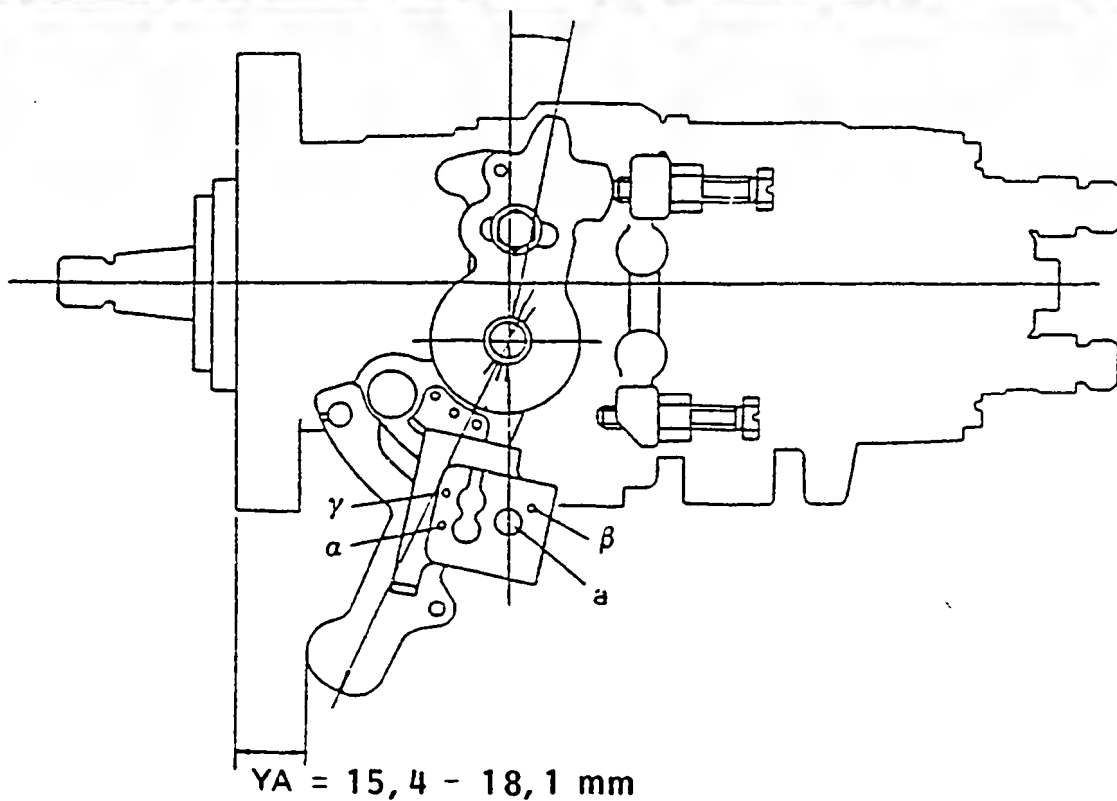


Fig. 39

104748-2640 2/4

Control lever angle measurement position

a = Measurement position

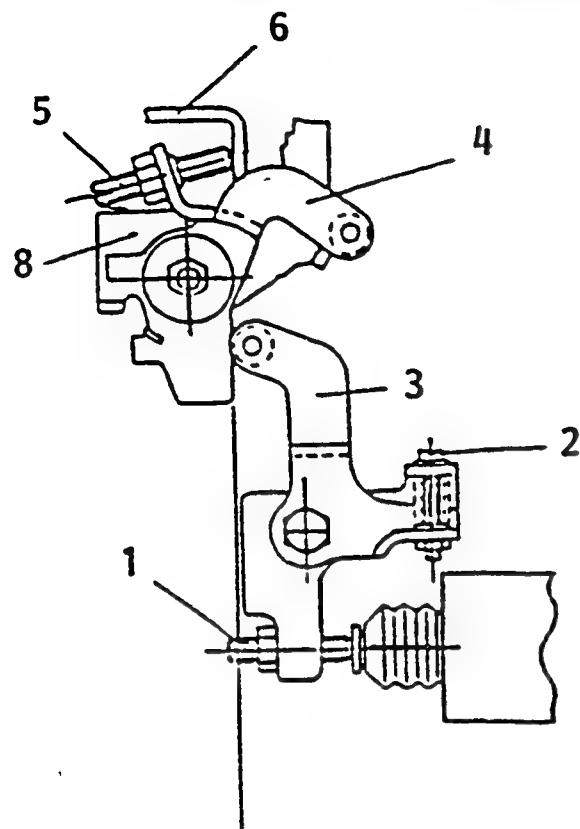


Fig. 40

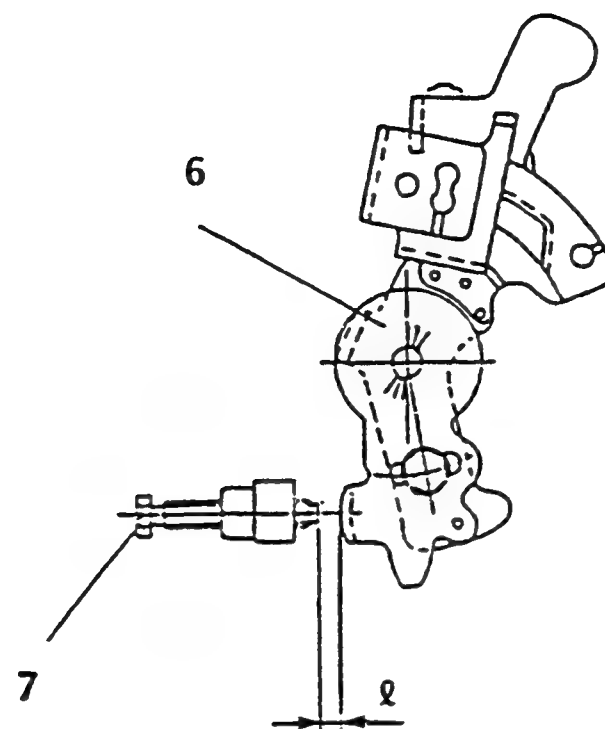


Fig. 41

l = Block gauge

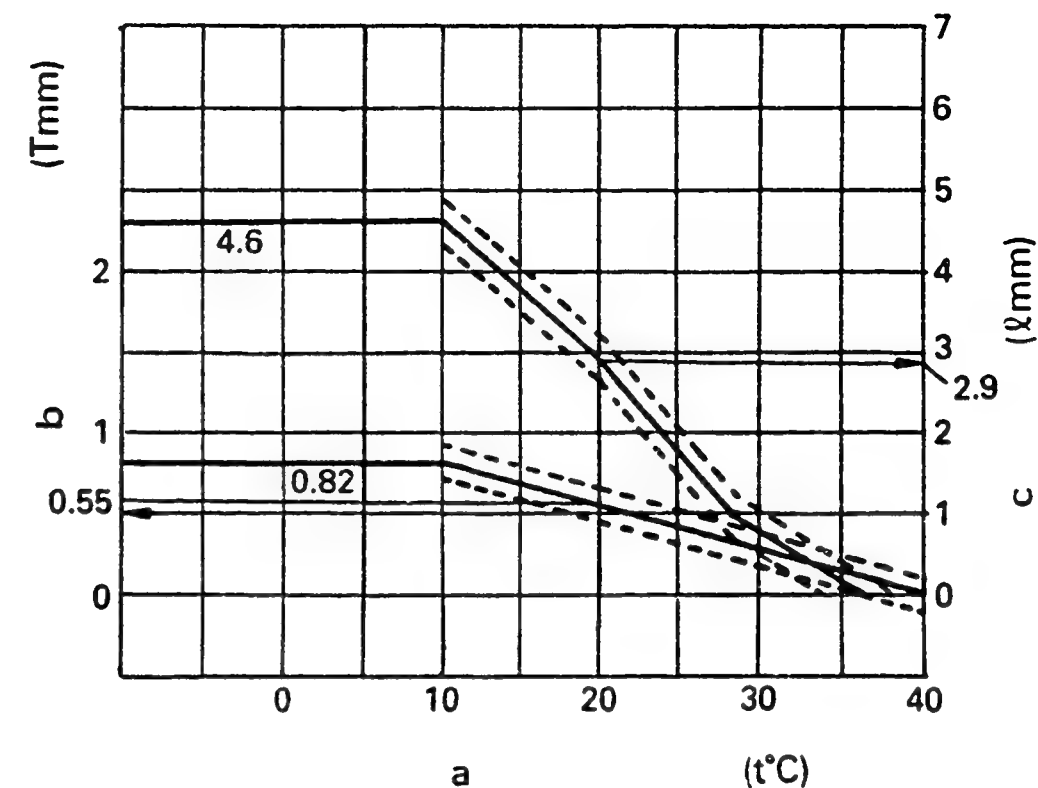


Fig. 42

104748-2640 3/4

a = Atmospheric temperature
b = Timer stroke
c = Gap between control lever and idling stopper bolt

■ W-CSD ADJUSTMENT

1. Timer stroke adjustment (Fig. 40)

Calculate the timer stroke from Fig. 42 according to the atmospheric temperature at the time of adjustment. Adjust using timer stroke adjusting screw (1) so that the timer stroke is as calculated in Fig. 42.

G4

ZEXEL - Test values
Injection pumps



G5

ZEXEL - Test values
Injection pumps



Formula for calculating (Fig. 42)

Formula for calculating timer stroke:

$$\begin{array}{ll} 10 \leq t \leq 20 & T = -0.027 t + 1.09 \\ 20 \leq t \leq 40 & T = -0.0275 t + 1.1 \end{array}$$

Formula for calculating control lever
and idling stopper bolt gap:

$$t \leq 10 \quad l = 4.6$$

$$10 < t \leq 20 \quad l = -0.17 t + 6.3$$

$$20 < t \leq 28.5 \quad l = -0.235 t + 7.6$$

$$28.5 < t \leq 36 \quad l = -0.12 t + 4.32$$

104748-2640 4/4

2. Adjustment of intermediate lever position (see Figs. 40 and 41)

Insert a thickness gauge $l = 4.1 \pm 0.05$ mm between the idling adjusting bolt (7) and the control lever (6). When the upper edge of the intermediate lever roller (4) is aligned with the top edge of the bracket (8), screw in the intermediate lever screw (5) so that it touches the intermediate lever (6).
Next, turn this screw a half to a full rotation clockwise. Turn it back to its previous position, and then tighten.
(During this process, the intermediate lever moves in the horizontal plane by 1° to 3° clockwise.)

3. Adjustment of CSD lever (see Figs. 40 and 41)

Insert the thickness gauge $l = \pm 0.05$ mm, as shown in the diagram (Fig. 42), between the idling adjusting bolt (7) and the control lever (6), and tighten the idling stopper bolt (2) at the point where the roller of the CSD lever (3) touches the intermediate lever (4).
(The temperature of the wax should be below 30°C during adjustment.)

Note :

When inserting the thickness gauge between levers (3) and (4), use the idling stopper bolt (2) to create a gap between them so that they are not subject to excessive force.

G6

ZEXEL - Test values
Injection pumps

**G7**

ZEXEL - Test values
Injection pumps



Test oil:		ZEXEL-TEST VALUES			1/4	
ISO 4113 od		Distributors pumps			BOSCH No. 9 460 610 369	
SAE J967d		Engine model: CD17			ZEXEL No. 104748-2700	
					Date: 25.6.1990 [0]	
					Company: NISSAN	
					No. 16700 54A17	
Injection pump no. 104648-2690		(NP-VE4/8F2500LNP374)				
Pump rotation: Counter clockwise-viewed from drive side		Test-nozzle holder combination: 1 688 901 000			Test pressure line: 1 680 750 017	
1. Setting values		Speed (rpm)	Setting values		Charge-air pressure bar (mmHg)	Difference (cc)
1-1	Timing device travel	1200	1.5 - 2.1 (mm)			2.5
1-2	Supply pump pressure	1200	3.1 - 3.7 (kg/cm²)			
1-3	Full load deliv. without charge-air pr.	1000	27.1 - 28.1 (cc/1000st)			
	Full load deliv. with charge-air pres.		(cc/1000st)			
1-4	Idle speed regulation	360	3.7 - 6.7 (cc/1000st)			
1-5	Start	100	50.3 - 60.3 (cc/1000st)			
1-6	Full-load speed regulation	2700	11.5 - 17.8 (cc/1000st)			
1-7	Load-timer adjustment					
1-8						
2. Test values						
2-1 Timing device		N = rpm	1200	1800	2500	
		mm	1.4 - 2.2	3.5 - 4.7	6.9 - 7.8	
2-2 Supply pump		N = rpm	1200	1800	2500	
		kg/cm²	3.0 - 3.8	4.4 - 5.2	6.1 - 6.9	
2-3 Overflow delivery		N = rpm	1200			
		cc/10s	36.0 - 80.0			
2-4 Fuel injection quantities						
Control lever position		Speed rpm	Fuel delivery (cc/1000 strokes)	Charge-air pres (mmHg)	Difference (cc)	
End stop		1000	26.6 - 28.6			
		600	24.8 - 28.8			
		2500	24.3 - 28.3			
		2700	11.3 - 18.3			
		2900	below 6.0			
Switch off		360	0			
Idle stop		360	3.2 - 7.2		2.5	
		600	below 3.0			
Partial load		700	5.1 - 14.1			
2-5 Solenoid		Cut-in voltage max. 8 V Test voltage: 12 - 14 V				

3. Dimensions		
K	3.2 - 3.4	mm
KF	5.7 - 5.9	mm
MS	1.7 - 1.9	mm
BCS	-	mm
Pre-str.	-	mm
Control lever angle		
α	1.0 - -1.0	deg
A	15.4 - 18.1	mm
β	39.0 - 49.0°	deg
B	11.0 - 16.0	mm
γ	13.5° - 14.5°	deg
C	8.6 - 9.2	mm

G8

ZEXEL - Test values
Injection pumps

G9

ZEXEL - Test values
Injection pumps

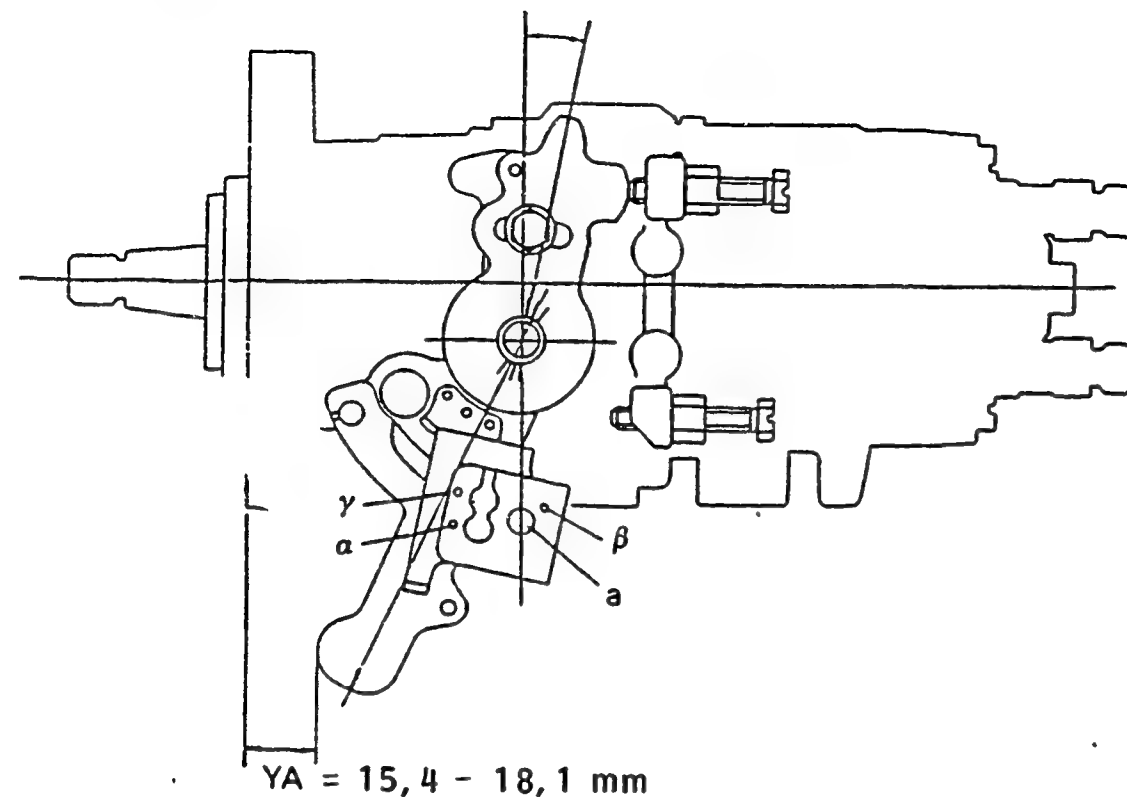


Fig. 43 Control lever angle measurement position

a = Measurement position

■ STARTING INJECTION QUANTITY ADJUSTMENT

Adjust the starting injection quantity (item 1-5) using the adjusting bolt (Fig. 44).

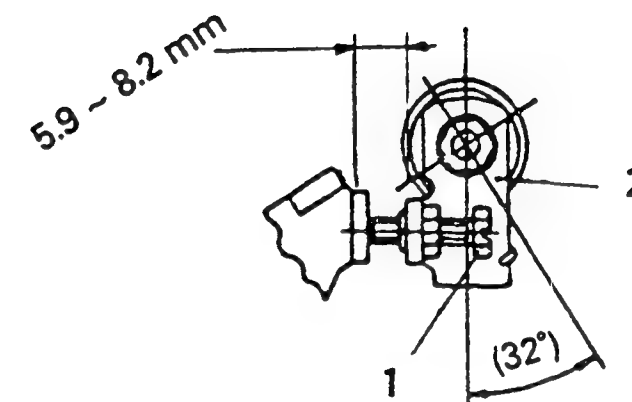


Fig. 44

104748-2700 2/4

1 = Adjusting bolt
2 = Stop lever



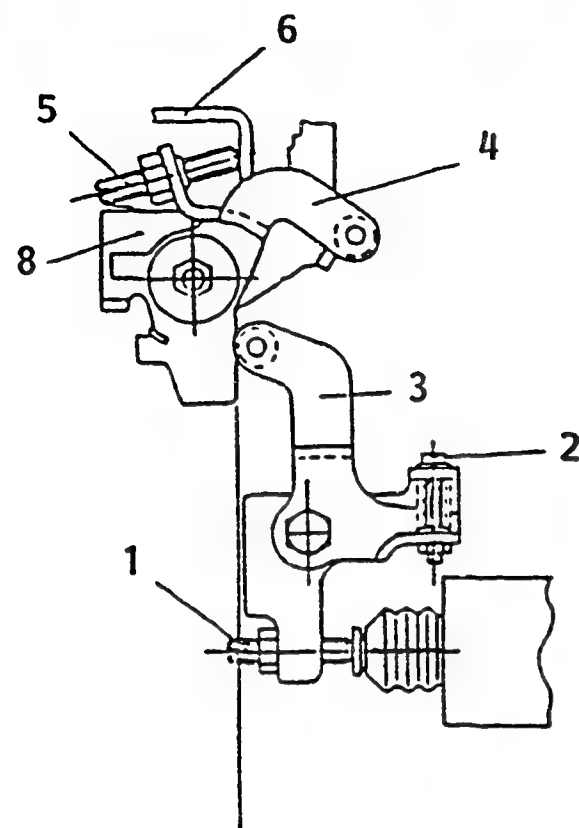


Fig. 45

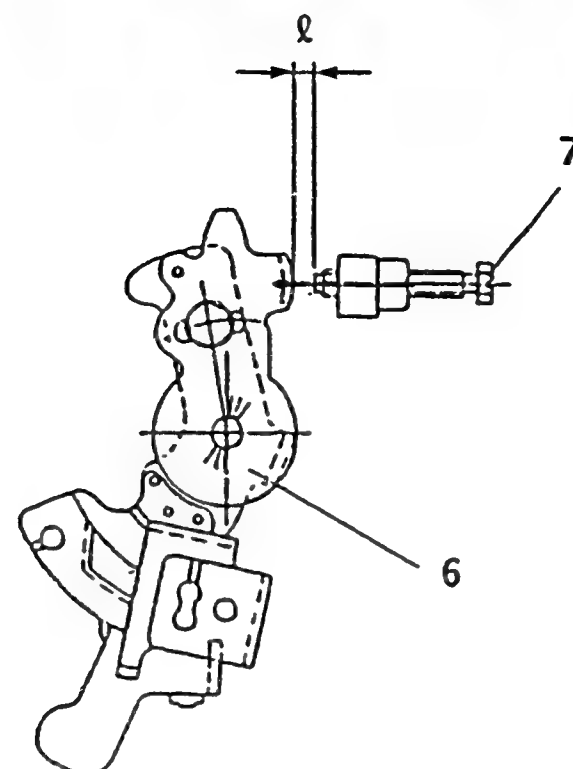


Fig. 46

l = Block gauge

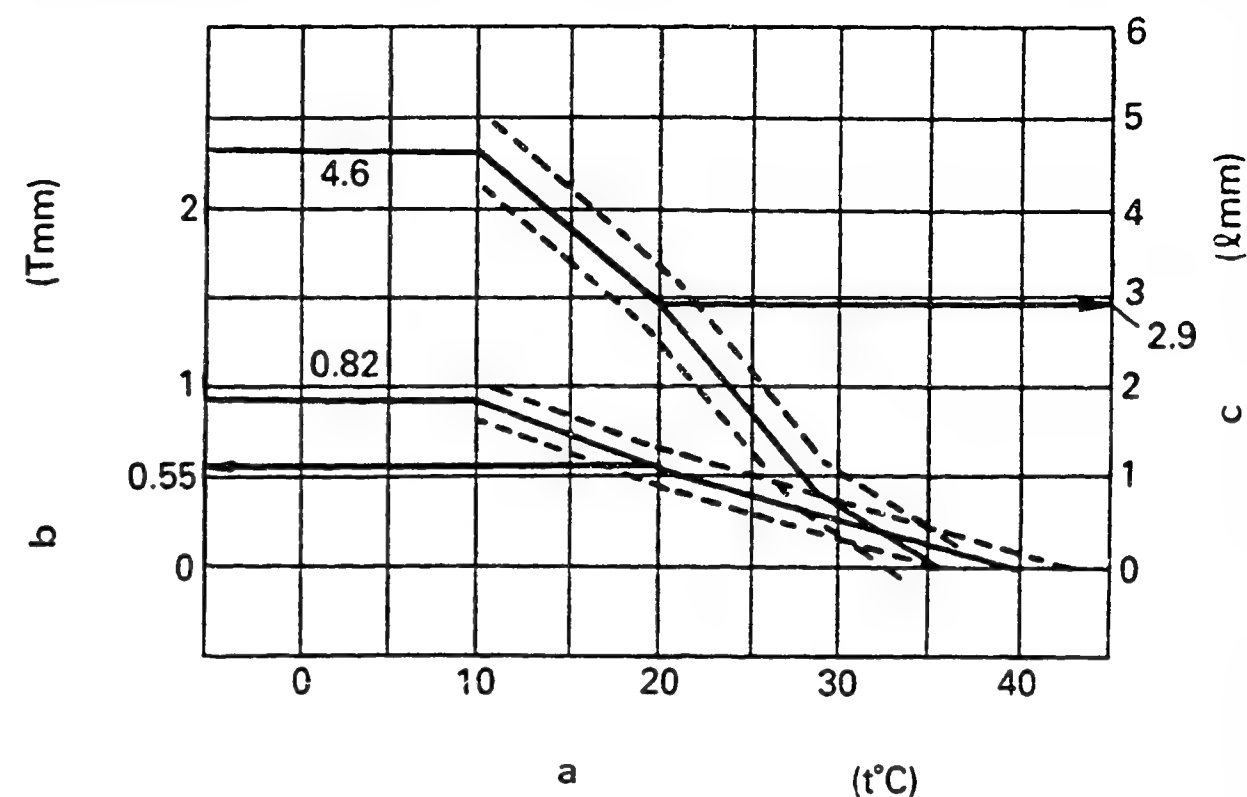


Fig. 47

104748-2700 3/4

a = Atmospheric temperature

b = Timer stroke

c = Gap between control lever and idling stopper bolt

W-CSD ADJUSTMENT

1. Timer stroke adjustment (Fig. 45)

Calculate the timer stroke from Fig. 47 according to the atmospheric temperature at the time of adjustment. Adjust using timer stroke adjusting screw (1) so that the timer stroke is as calculated in Fig. 47.



Formula for calculating (Fig. 45)

Formula for calculating timer stroke:

$$\begin{array}{ll} 10 \leq t \leq 20 & T = -0.027 t + 1.09 \\ 20 \leq t \leq 40 & T = -0.0275 t + 1.1 \end{array}$$

Formula for calculating control lever
and idling stopper bolt gap:

$$t \leq 10 \quad l = 4.6$$

$$10 < t \leq 20 \quad l = -0.17 t + 6.3$$

$$20 < t \leq 23.5 \quad l = -0.235 t + 7.6$$

$$28.5 < t \leq 36 \quad l = -0.12 t + 4.32$$

104748-2700 4/4

2. Adjustment of intermediate lever position (see Figs. 45 and 46)

Insert a thickness gauge $l = 4.1 \pm 0.05$ mm between the idling adjusting bolt (7) and the control lever (6). When the upper edge of the intermediate lever roller (4) is aligned with the top edge of the bracket (8), screw in the intermediate lever screw (5) so that it touches the intermediate lever (6).

Next, turn this screw a half to a full rotation clockwise. Turn it back to its previous position, and then tighten. (During this process, the intermediate lever moves in the horizontal plane by 1° to 3° clockwise.)

3. Adjustment of CSD lever (see Figs. 45 and 46)

Insert the thickness gauge $l = \pm 0.05$ mm, as shown in the diagram (Fig. 47), between the idling adjusting bolt (7) and the control lever (6), and tighten the idling stopper bolt (2) at the point where the roller of the CSD lever (3) touches the intermediate lever (4).

(The temperature of the wax should be below 30°C during adjustment.)

Note :

When inserting the thickness gauge between levers (3) and (4), use the idling stopper bolt (2) to create a gap between them so that they are not subject to excessive force.



Test oil:		ZEXEL-TEST VALUES			1/4	
ISO 4113 od		Distributors pumps			BOSCH No. 9 460 610 380	
SAE J967d		Engine model: LD20 (XP)			ZEXEL No. 104749-2262	
					Date: 25.6.1990 [0]	
					Company: NISSAN	
					No. 16700 D4600	
Injection pump no. 104649-2192		(NP-VE4/9F2500RNP359)				
Pump rotation: Clockwise-viewed from drive side		Test-nozzle holder combination: 1 688 901 000			Test pressure line: 1 680 750 017	
1. Setting values		Speed (rpm)	Setting values		Charge-air pressure bar (mmHg)	Difference (cc)
1-1	Timing device travel	900	1.3 - 1.7 (mm)			2.5
1-2	Supply pump pressure	900	3.2 - 3.8 (kg/cm²)			
1-3	Full load deliv. without charge-air pr.	900	30.5 - 31.5 (cc/1000st)			
	Full load deliv. with charge-air pres.		(cc/1000st)			
1-4	Idle speed regulation	350	4.7 - 7.7 (cc/1000st)			
1-5	Start	100	40.0 - 60.0 (cc/1000st)			
1-6	Full-load speed regulation	2700	10.9 - 16.9 (cc/1000st)			
1-7	Load-timer adjustment					
1-8						
2. Test values						
2-1 Timing device		N = rpm	900	1800	2300	3. Dimensions
		mm	1.2 - 1.8	5.5 - 6.7	7.7 - 8.9	
2-2 Supply pump		N = rpm	900	1800	2500	
		kg/cm²	3.1 - 3.9	5.1 - 5.9	6.8 - 7.6	
2-3 Overflow delivery		N = rpm	900			
		cc/10s	35.0 - 79.0			
2-4 Fuel injection quantities						
Control lever position		Speed rpm	Fuel delivery (cc/1000 strokes)	Charge-air pres(mmHg)	Difference (cc)	
End stop		600	29.5 - 33.5			
		900	30.0 - 32.0			
		2300	28.9 - 32.9			
		2700	10.4 - 17.4			
		2800	below 6.0			
Switch off		350	0			
Idle stop		350	4.2 - 8.2		2.2	
		500	below 4.5			
Partial load		900	4.1 - 14.1			
2-5 Solenoid		Cut-in voltage max. 8 V Test voltage: 12 - 14 V				
3. Dimensions						
K	3.2 - 3.4 mm					
KF	5.7 - 5.9 mm					
MS	1.1 - 1.3 mm					
BCS	- mm					
Pre-str.	- mm					
Control lever angle						
α	21.0 - 29.0 deg					
A	7.6 - 11.7 mm					
β	39.0 - 49.0 deg					
B	11.9 - 15.6 mm					
γ	10.5 - 11.5 deg					
C	5.5 - 6.1 mm					

G16

ZEXEL - Test values
Injection pumps

G17

ZEXEL - Test values
Injection pumps

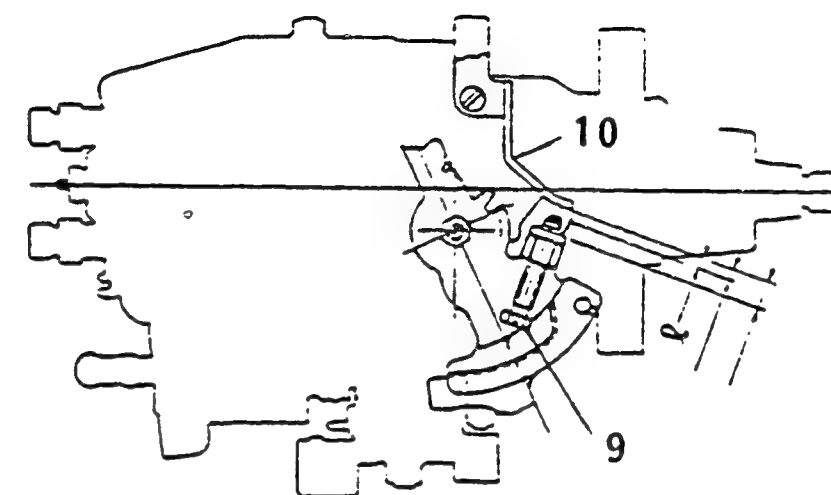
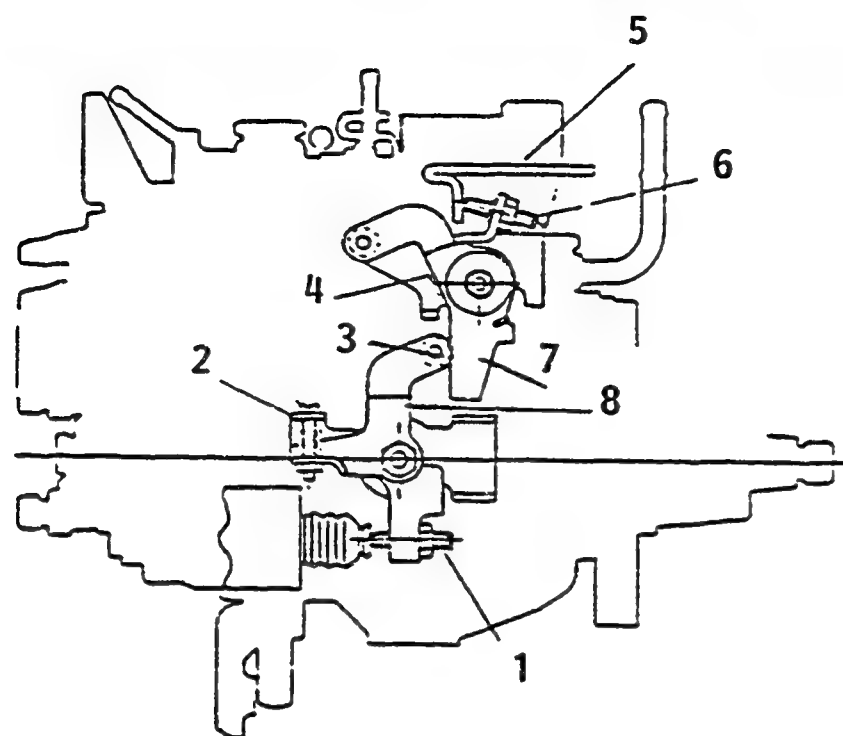


Fig. 48

104749-2262 2/4

- 1 = Timer stroke adjusting screw
- 2 = Idling adjusting bolt
- 3 = Lever roller
- 4 = Aligning mark

- 5 = Control lever
- 6 = Intermediate lever set screw
- 7 = Intermediate lever
- 8 = CSB lever

- 9 = Idling stopper bolt
- 10 = Bracket

■ W-CSD ADJUSTMENT

1. Timer stroke adjustment (adjust to the thick line)

- 1) Calculate the timer stroke from Fig. 49 according to the atmospheric temperature at the time of adjustment.
- 2) Adjust using the timer stroke adjusting screw so that the timer stroke is as calculated.

G18

ZEXEL - Test values
Injection pumps



G19

ZEXEL - Test values
Injection pumps



(Continued)

2. Intermediate lever position adjustment

- 1) Insert a block gauge (thickness gauge) of 0.25 ± 0.05 mm thickness between the bracket and the idling stopper bolt.
- 2) Align the intermediate lever with the aligning mark.
- 3) Adjust the intermediate lever set screw to that the control lever and the intermediate lever set screw are in contact, and then fix in position using the locknut.



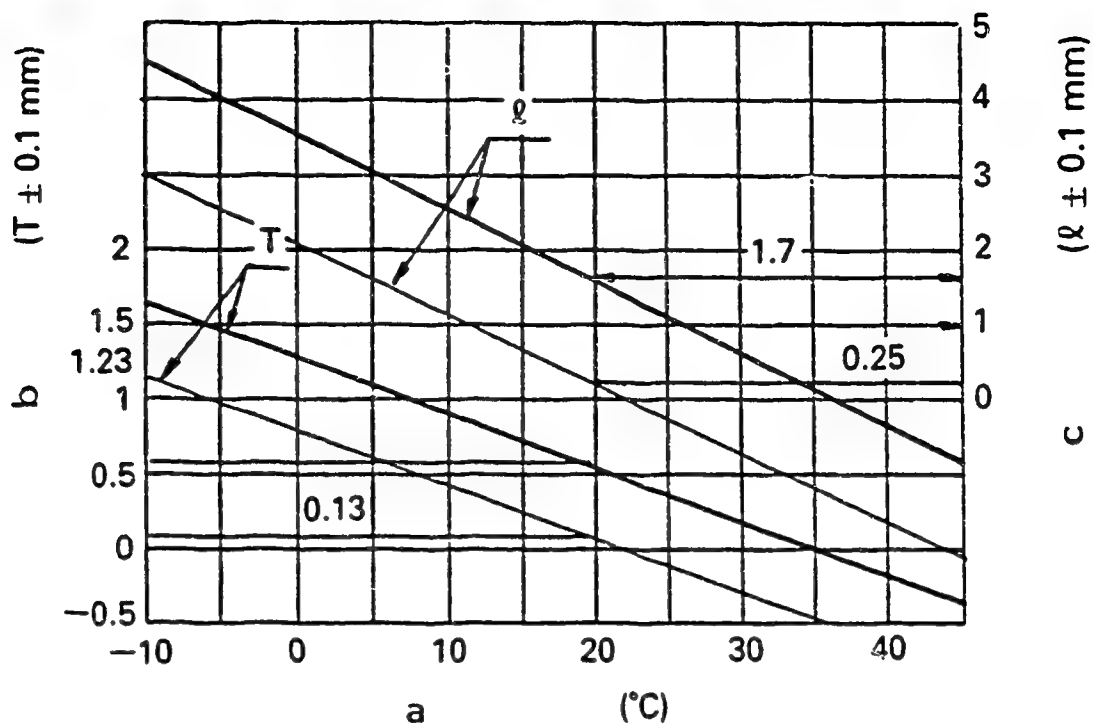


Fig. 49

104749-2262 3/4

a = Atmospheric temperature

b = Timer stroke

c = Gap between control lever
and idling stopper bolt

Thick line: For temporary adjustment

Thin line: For final adjustment

Formula for calculating timer stroke: (Fig. 49)

$$T = -0.0367 t + 1.424$$

Formula for calculating control lever and idling
stopper bolt gap:

$$l = -0.095 l + 3.6.$$



(Continued)

3. CSD lever adjustment (adjust to the thick line)

- 1) Calculate the block gauge dimension $l \pm 0.05$ mm from (Fig. 49) according to the atmospheric temperature at the time of adjustment.
- 2) Insert the block gauge (thickness gauge) selected in (Fig. 49) between the bracket and the idling stopper bolt.
- 3) Using the idling bolt, adjust so that the CSD lever roller and the intermediate lever are in contact.

4. Final adjustment

After completing the adjustment, screw the timer stroke adjusting screw two turns clockwise.
(Move from the temporary adjustment chart to the final adjustment chart).

- * This W-CSD's timer stroke operations are effective at atmospheric temperatures of 27°C or above.

Therefore, to make adjustment at normal temperatures possible, after adjusting to the substitute characteristics, tighten the timer stroke adjusting screw two turns.



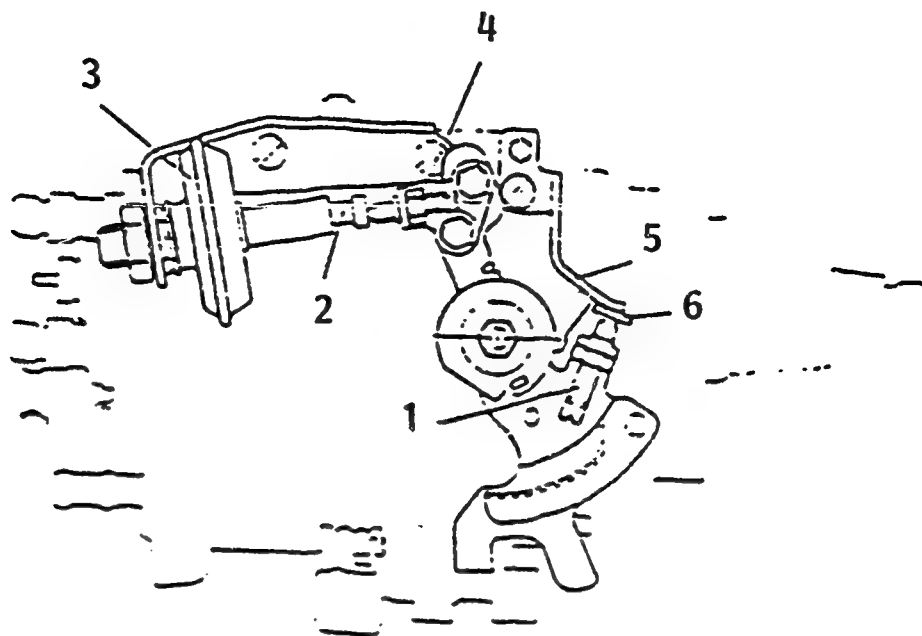


Fig. 50

104749-2262 4/4

- 1 = Idling stopper bolt
- 2 = Push rod
- 3 = Dashpot
- 4 = Dashpot adjusting screw
- 5 = Bracket
- 6 = Block gauge

■ DASH POT ADJUSTMENT

1. Insert a block gauge (thickness gauge) of thickness 3.8 ± 0.05 mm in the gap between the idling stopper bolt and the bracket.
2. With the control lever positioned as described in 1. above, adjust the dashpot adjusting screw so that the dashpot adjusting screw and the push rod are in contact.
Fix the screw using the nut.



Test oil:		ZEXEL-TEST VALUES		BOSCH No. 9 460 610 439	
ISO 4113 od		Distributors pumps		ZEXEL No. 104761-4013	
SAE J967d		Engine model: 6D95L		Date: 25.6.1990 [3]	
				Company: KOMATSU	
				No. 6206711171	
Injection pump no. 104661-4012		(NP-VE6/11F1075RNP39)			
Pump rot.: Clockw.-viewed from drive side		Test-nozzle holder combination:		Test pressure line:	
Prestroke: - mm		1 688 901 000		1 680 750 017	
1. Setting values		Speed (rpm)	Setting values	Charge-air pressure bar (mmHg)	Difference (cc)
1-1	Timing device travel		(mm)		
1-2	Supply pump pressure	250	1.5 - 1.9 (kg/cm²)		
1-3	Full load deliv. without charge-air pr.	750	45.1 - 46.1 (cc/1000st)		3.0
	Full load deliv. with charge-air pres.		(cc/1000st)		
1-4	Idle speed regulation	350	10.2 - 14.2 (cc/1000st)		2.0
1-5	Start	100	60.0 - 90.0 (cc/1000st)		
1-6	Full-load speed regulation	1150	14.5 - 20.5 (cc/1000st)		4.5
1-7	Load-timer adjustment				
1-8					
2. Test values					
2-1 Timing device		N = rpm mm			
2-2 Supply pump		N = rpm kg/cm²	250 1.5 - 1.9	750 2.6 - 3.6	
2-3 Overflow delivery		N = rpm cc/10s		750 30.0 - 73.3	
2-4 Fuel injection quantities					
Control lever position		Speed rpm	Fuel delivery (cc/1000 strokes)	Charge-air pres (mmHg)	Difference (cc)
End stop		500	42.1 - 47.1		
		750	44.6 - 46.6		
		1075	35.6 - 40.6		
		1150	14.0 - 21.0		
		1200	below 3.0		
Switch off		100 500	below 18.0 (full) 0 (idle)		
Idle stop		200	37.3 - 47.3		
		250	28.3 - 38.3		
		350	10.2 - 14.2		
		450	below 3.0		
2-5 Solenoid		Cut-in voltage max.16 V Test voltage: 24 - 26 V			

3. Dimensions		
K	2.7 - 2.9	mm
KF	4.9 - 5.1	mm
MS	0.8 - 1.0	mm
BCS	-	mm
	-	mm
Control lever angle		
α	21.0 - 29.0	deg
A	2.5 - 7.7	mm
β	35.0 - 45.0	deg
B	10.1 - 14.1	mm
γ		deg
C		mm

G24

ZEXEL - Test values
Injection pumps



G25

ZEXEL - Test values
Injection pumps



ZEXEL - TEST VALUES
Injections pumps

BOSCH No.	:	9 400 610 110	1/4
ZEXEL No.	:	106671-3282	
Date	:	25.06.1990	[3]
Company	:	HINO	
Engine	:	EK100 / 22000-2175A	

IP-Type number	:	106067-5491 / PE6P
Governor type number	:	105488-7480 EP/RFD-B

TEST PREREQUISITES

Test oil	:	ISO-4113
Test oil inlet temperature °C	:	40.00...45.00
Inlet pressure	bar :	1.6
Test nozzle holder combination	:	1 688 901 013
Opening pressure	bar :	175
Test pressure line		
Inner x Outer Dia - Length	mm :	3.00 x 8.00 x 600

PORT CLOSING

Prestroke	mm :	3.3 ± 0.06
Rod position	mm :	-
Port closing mark	Cyl. No. :	-
Cam sequence	:	1-4-2-6-3-5
Port closing mark	Cyl. No. :	-
Port closing difference	°NW :	0-60-120-180-240-300
Tolerance	+ - °C:	0.50 (0.75)



Continued (Test values)

Injection Quantity :

Adjusting Point	Rod Pos. (mm)	Speed (rpm)	Injection Q'ty (cc/1000 str.)	Difference (%)	Fixed	Remarks
A	9.9	500	125.5 \pm 3	\pm 4	Lever	
B	10.4	700	141.2 \pm 2	\pm 2	Lever	Basic
C	10.9	1150	149.7 \pm 3	\pm 4	Lever	
D	approx. 5.5	225	16 \pm 3	\pm 15	Rack	
E	(11.4)	100	135 \pm 20	-	Lever	

Timing Advance Specification : EP/SP
105635-0111

Speed (rpm)	950	1000	1050	1150			
Advance Angle (deg)	below 0.5	below 1.5	1.4-2.4	4.2-4.8			

H2

ZEXEL - Test values
Injection pumps



H3

ZEXEL - Test values
Injection pumps



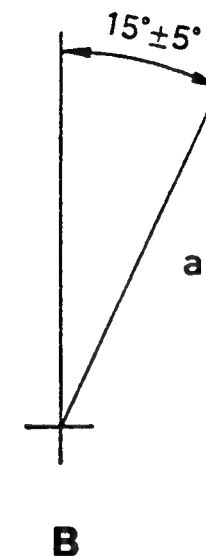
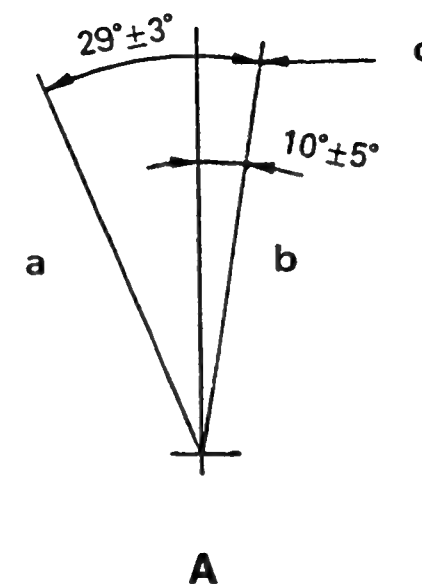
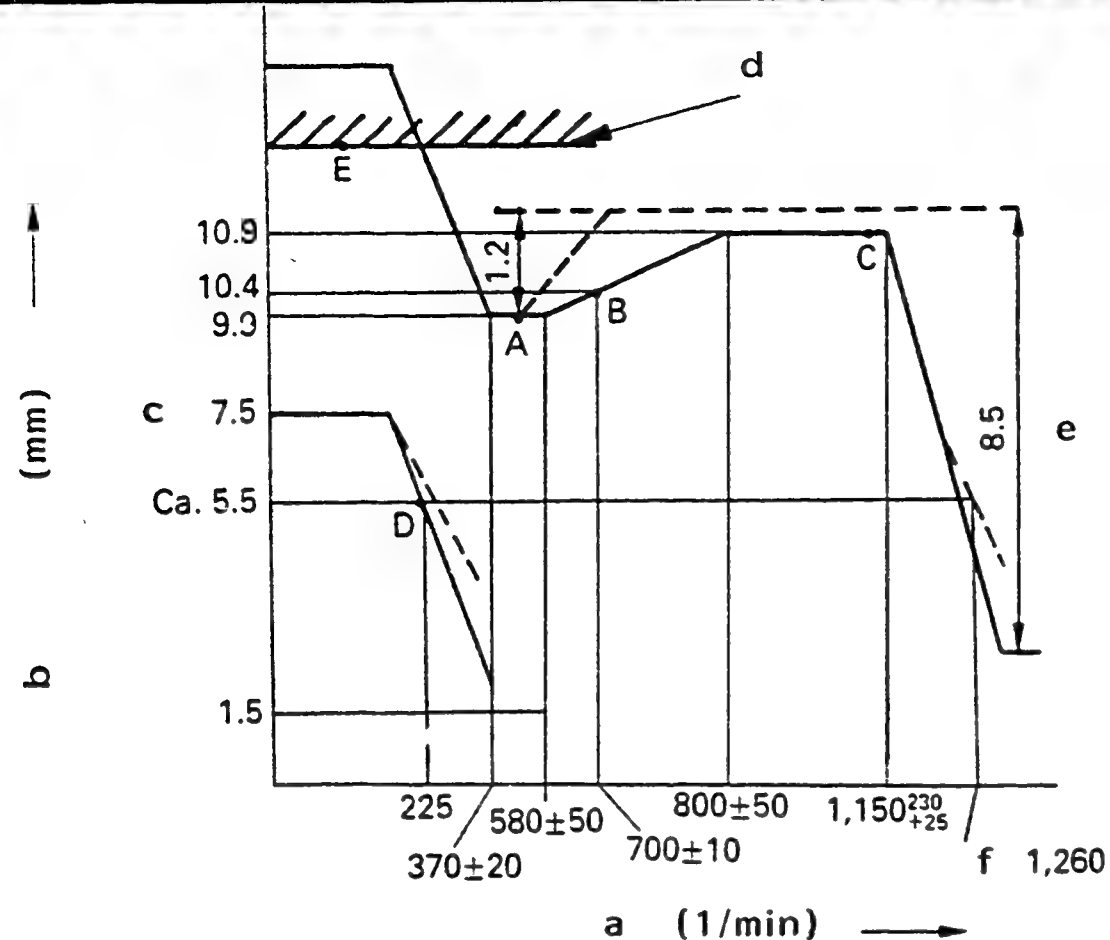


Fig.51

GOVERNOR ADJUSTMENT

106671-3282 2/4

- a = Pump speed
- b = Control rack position
- c = above
- d = Rack limit: 11.4±0.2
- e = Damper spring setting: 5 - 0.2
- f = below

Note

Before adjustment, first remove the damper spring, the cover and the idling spring capsule.

A = Load control lever angle

B = Speed control lever angle

- a = Full-load
- b = Idling
- c = Stopper bolt set

a = Full-speed

H4

ZEXEL - Test values
Injection pumps



H5

ZEXEL - Test values
Injection pumps



	Speed (rpm)	Rack position (mm)	Remarks
Torque control stroke adjustment (temporarily)	approx. 800	11.1	• Speed control lever and load control lever: temporary setting
	approx. 500	9.9	• Adjust using adjusting screw (2)
	approx. 600	11.1	• Confirm
Flyweight lift and full-load position	700 - 800	10.9	• Speed control lever temporary setting
	approx. 1300	approx. 2.4	• Adjust using screw (3)
	Decrease pump speed to 1150 rpm and adjust the high speed lift value (8.5 + 0.5) mm using screw (2).		
Idling adjustment	470	1.5	• Adjust using screw (4)
	225	approx. 5.5	• Adjust using spring capsule (6)
	0	above 7.5	• Confirm
	370 ± 20	1.5	• Confirm
Damper spring setting	Maintain the pump speed at 225 rpm and set the control rod at the approx. 5.5 mm position using the control lever. Then, gradually increase the pump speed until the rod position is 5.9 - 0.2 mm. Tighten the damper spring capsule and fix it in the position where it begins to move the rod from the 5.9 - 0.1 mm position.		
Maximum speed starting point and speed droop check	Fix the load control lever in the full-load position and fix the speed control lever in the full-speed position.		
	1150 +30 +25 below 1260	10.9 approx. 5.5	• Adjust using screw (4)
	approx. 1300	-	• Confirm • Confirm the control lever angle (speed lever angle: 15° ± 5°; load lever angle: 29° ± 3°) • Confirm that there is no fuel injection
Torque control spring adjustment	Fix the load control lever in the full-load position and fix the speed control lever in the full-speed position.		
	700 ± 10	10.4	• Adjust using torque control spring capsule (7)
	580 ± 50 800 ± 50	9.9 10.9	• Confirm • Confirm
Smoke limiter setting	Fix the load control lever in the full-load position		
	100 100	11.4 + 0.2 -	• Adjust using rack limiter • Confirm injection quantity at point E.



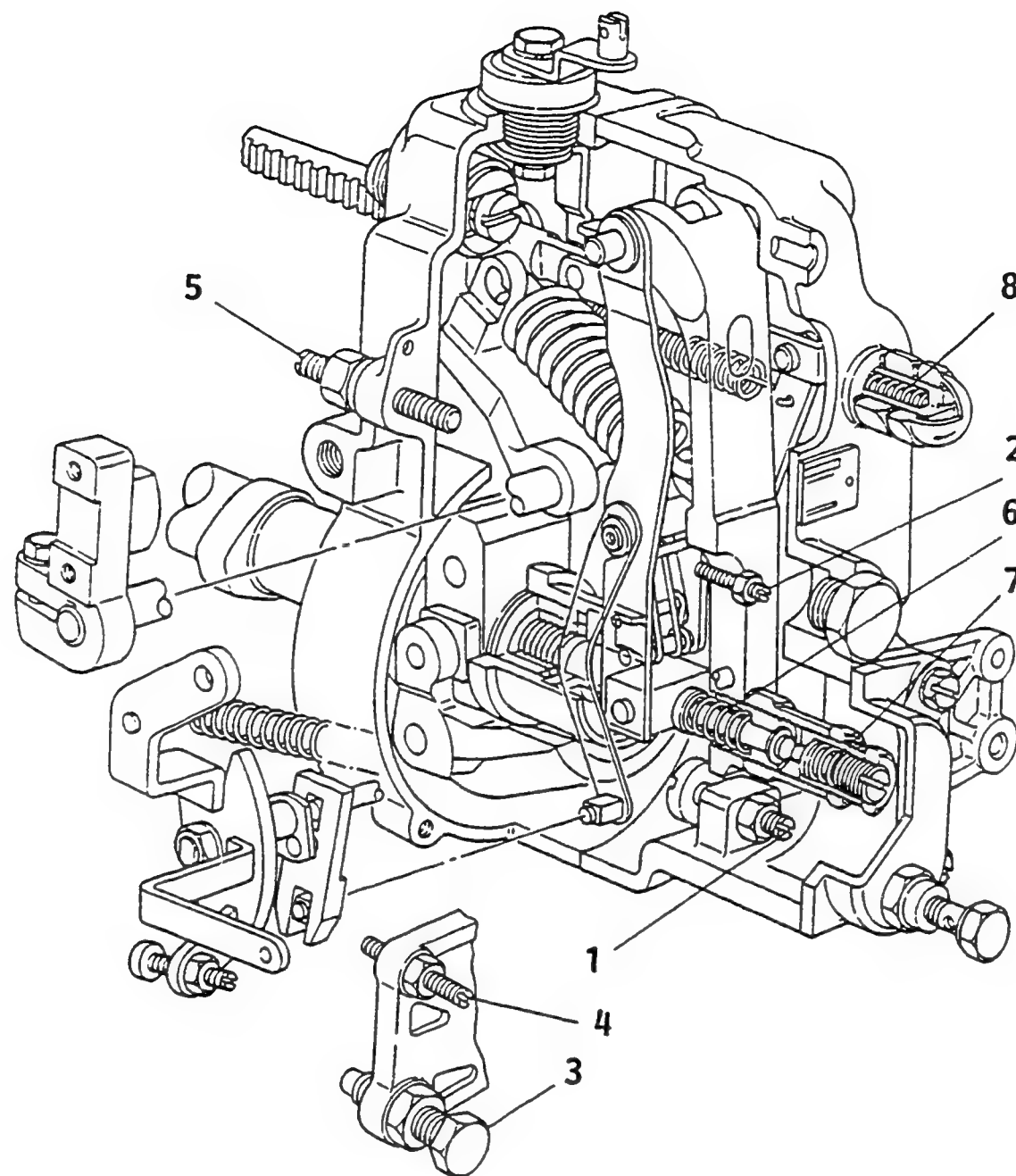


Fig. 52

1 = Screw
2 = Screw
3 = Screw
4 = Screw

5 = Screw
6 = Spring capsule
7 = Spring capsule
8 = Spring capsule

106671-3282 4/4

H8

ZEXEL - Test values
Injection pumps



H9

ZEXEL - Test values
Injection pumps



ZEXEL - TEST VALUES Injections pumps

BOSCH No.	:	9 400 610 111	1/5
ZEXEL No.	:	106671-3484	
Date	:	25.06.1990	[3]
Company	:	HINO	
Engine	:	EK100 / 22000-3635A	

IP-Type number	:	106067-7510 / PE6P
Governor type number	:	105488-8600 EP/RFD-C

TEST PREREQUISITES

Test oil	:	ISO-4113
Test oil inlet temperature °C	:	40.00...45.00
Inlet pressure bar	:	1.6
Test nozzle holder combination	:	1 688 901 013
Opening pressure bar	:	175
Test pressure line		
Inner x Outer Dia - Length mm	:	2.00 x 6.00 x 600

PORT CLOSING

Prestroke	mm	:	3.3 ± 0.01
Rod position	mm	:	-
Port closing mark Cyl. No.	:	:	-
Cam sequence	:	:	1-4-2-6-3-5
Port closing mark Cyl. No.	:	:	-
Port closing difference °NW	:	:	0-60-120-180-240-300
Tolerance	+- °C	:	0.50 (0.75)

H10

ZEXEL - Test values
Injection pumps



Continued (Test values)

Injection Quantity :

Adjusting Point	Rod Pos. (mm)	Speed (rpm)	Injection Q'ty (cc/1000 str.)	Difference (%)	Fixed	Remarks
A	(9.9)	500	115.5 - 117.5	± 4	Lever	
B	(10.3)	700	125.7 - 129.7	± 2	Lever	
C	(10.6)	1150	131.7 - 137.7	± 4	Lever	
D	approx. 7.0	225	12.0 - 18.0	± 15	Rack	
E	-	100	119.3 - 133.7	-	Lever	

Timing Advance Specification : EP/SP
105635-0041

Speed (rpm)	650-750	900	1150				
Advance Angle (deg)	Start 0	0.9-1.9	3.5-4.5				

H11

ZEXEL - Test values
Injection pumps



H12

ZEXEL - Test values
Injection pumps



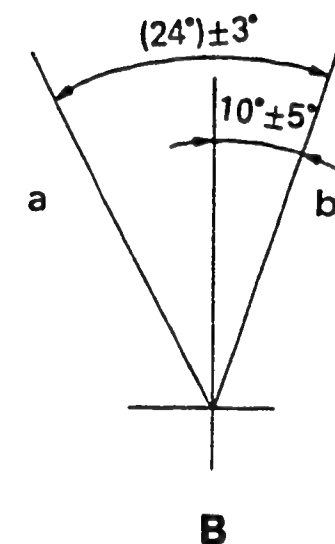
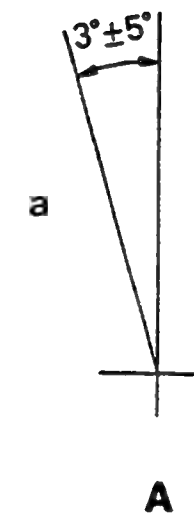
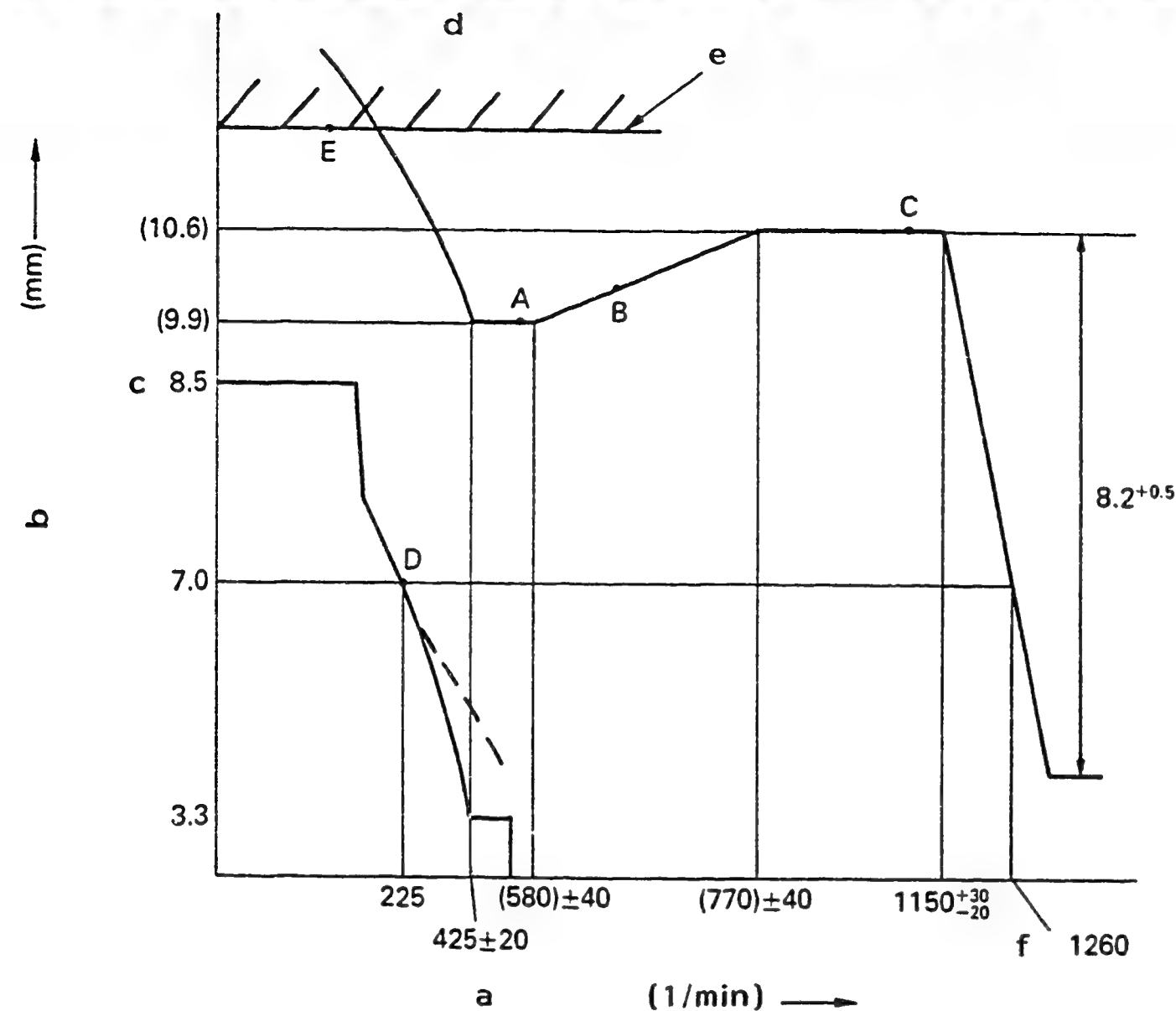


Fig.53

GOVERNOR ADJUSTMENT

106671-3484 2/5

- a = Pump speed
- b = Control rack position
- c = above
- d = Damper spring set: 6.2 - 0.2
- e = Rack limit
- f = below

Note

Before adjustment, first remove the damper spring, the cover and the idling spring capsule.

A = Speed control lever angle

B = Stopper bolt set

a = Full-speed

a = Full-load

b = Idling

H13

ZEXEL - Test values
Injection pumps



H14

ZEXEL - Test values
Injection pumps



	Speed (rpm)	Rack position (mm)	Remarks
Torque control stroke adjustment (temporarily)	approx. 800 approx. 500 approx. 700	(10.6) (9.9) (10.3)	<ul style="list-style-type: none"> • Speed control lever and load control lever: temporary setting • Adjust using adjusting screw (6) • Confirm
Flyweight lift and full-load position	1000 1170 - 1180 approx. 1300	(10.6) (10.6) approx. 2.4	<ul style="list-style-type: none"> • Adjust using screw (1) • Adjust using screw (8) • Adjust using screw (3)
	Decrease pump speed to 1150^{+25+10} rpm and adjust the high speed lift value (8.2 ± 0.5) mm using screw (3).		
Idling adjustment	525 225 0 425 ± 20	3.3 7.0 above 8.5 3.3	<ul style="list-style-type: none"> • Adjust using screw (8) • Adjust using spring capsule (5) • Confirm • Confirm the control lever angle is $(10^\circ \pm 5^\circ)$
Damper spring setting	Maintain the pump speed at 225 rpm and set the control rod at the 7.0 mm position using the control lever. Then, gradually increase the pump speed until the rod position is $6.2 - 0.2$ mm. Tighten the damper spring capsule and fix it in the position where it begins to move the rod from the $6.2 - 0.1$ mm position.		
Maximum speed starting point and speed droop check	Fix the load control lever in the full-load position and fix the speed control lever in the full-speed position.		
	1150^{+30+20} below 1260 approx. 1300	(10.6) 7.0 -	<ul style="list-style-type: none"> • Adjust using screw (2) • Confirm • Confirm the control lever angle (speed lever angle: $3^\circ \pm 5^\circ$; load lever angle: approx. 24°) • Confirm that there is no fuel injection
Torque control spring adjustment	Fix the load control lever in the full-load position and fix the speed control lever in the full-speed position.		
	(700) (580) ± 40 (770) ± 40	(10.3) (9.9) (10.6)	<ul style="list-style-type: none"> • Adjust using torque control spring capsule (5) • Confirm • Confirm
Smoke limiter setting	Fix the load control lever in the full-load position		
	100	-	<ul style="list-style-type: none"> • Adjust using rack limiter • Adjust injection quantity at point E, using rack limiter.



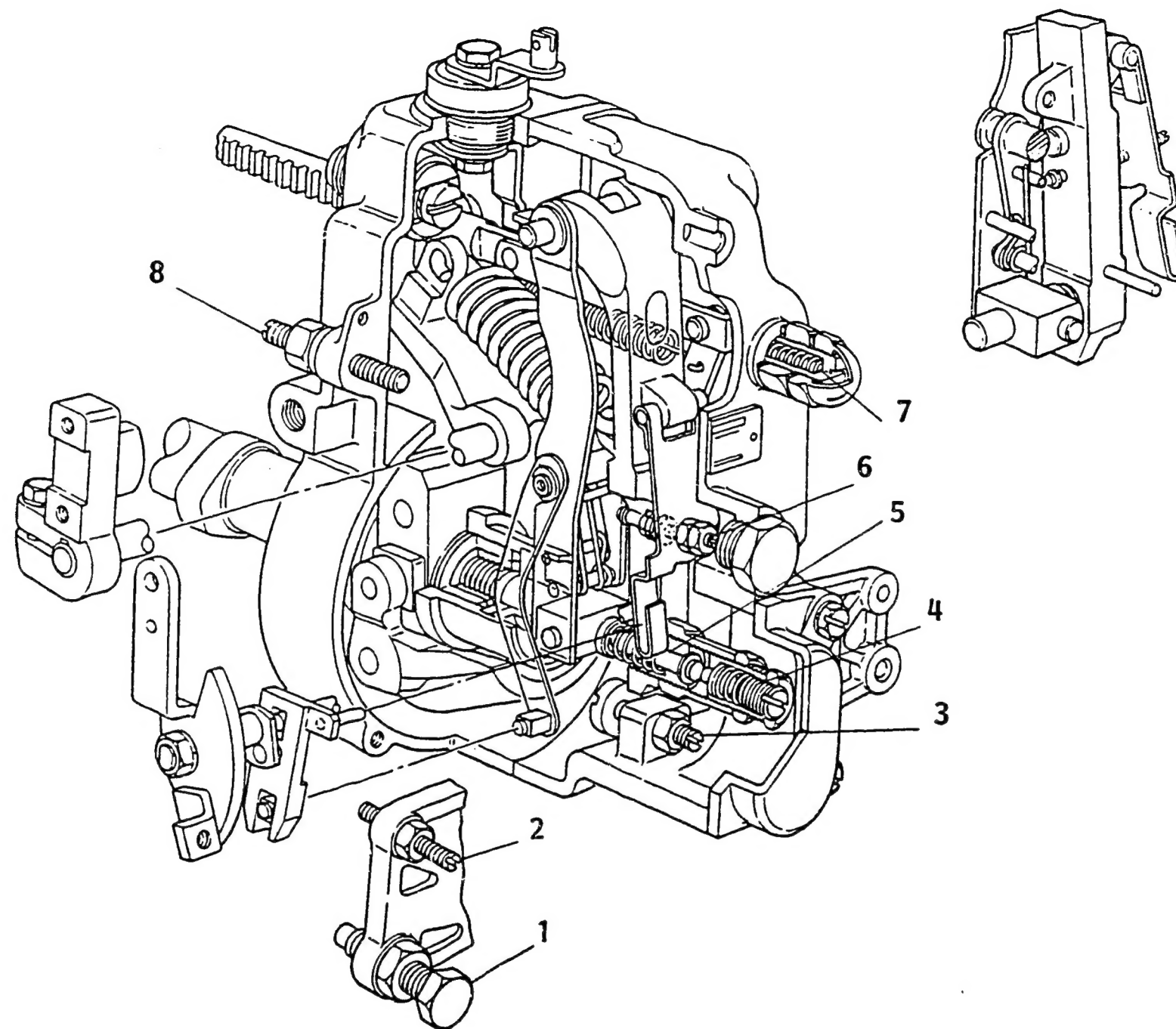


Fig. 54

- 1 = Screw
- 2 = Screw
- 3 = Screw
- 4 = Spring capsule

- 5 = Spring capsule
- 6 = Screw
- 7 = Spring capsule
- 8 = Screw

106671-3484 4/5

H17

ZEXEL - Test values
Injection pumps



H18

ZEXEL - Test values
Injection pumps



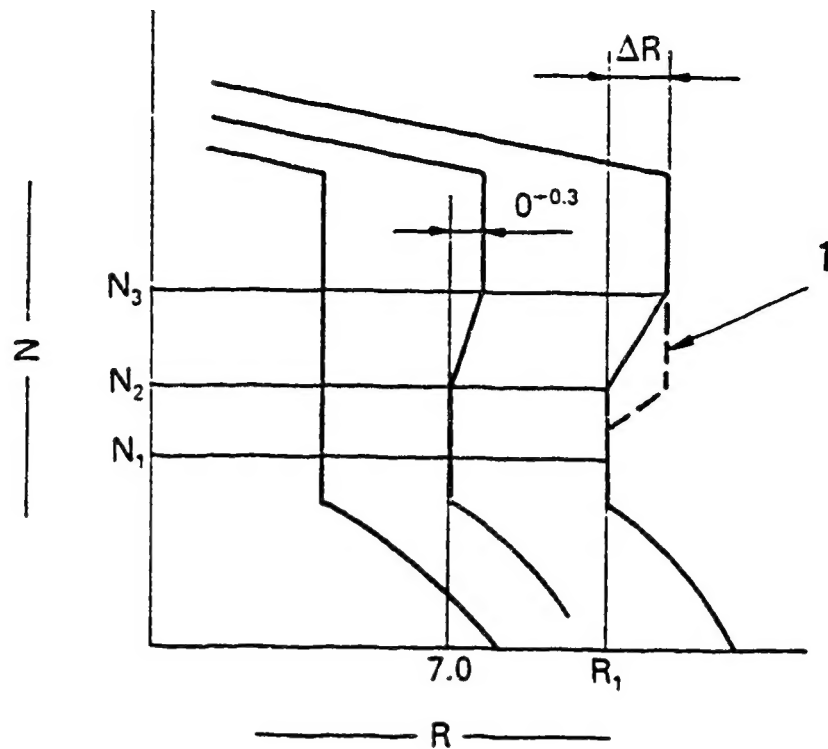


Fig. 55

106671-3484 5/5

1 = Torque control spring less

Negative torque control governor adjustment

The adjustment procedure is identical to that of current RFD + governors, although with RFD + governors the full-speed lever must be used when determining the positive torque control stroke.

1. Remove the torque control spring capsule.
2. Operate the pump at approx. 500 rpm (N_1 ; the point at which the idling spring stops operating is $< N_1$).



(Continued)

3. Move the full-speed lever towards the FULL position and set it at R_1 .
4. Increase the pump speed by adjusting the screw, and ensure that the torque control stroke ΔR can be obtained.

Note:

The screw is located in the bracket on the end of the tension lever, and is accessible through the adjustment opening.

5. Adjust N_2 and N_3 using the torque control spring capsule.

